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ABSTRACT

The purpose of this handbook is to provide guidance to data management staff within health planning agencies concerning the assemblage, analysis, and application of data for the purposes of health planning and resources development. Detailed information concerning practical, step-by-step approaches to data acquisition, analysis, and use is included. Six chapters cover the following topics: (1) the need for health services utilization data; (2) a study of the utilization of ambulatory care services--physician productivity and availability, patterns of ambulatory care utilization, facility management, and outpatient facility and manpower needs; (3) a study of the utilization of hospital inpatient services; (4) a study of the utilization of nursing home facilities; (5) a study of ambulance services; (6) a family health survey--measures of health status, chronic health problems, disability, use of needed physician services, and barriers to access. (JD)

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Health Planning
Information Series

A Data Acquisition and Analysis Handbook for Health Planners

Volume II

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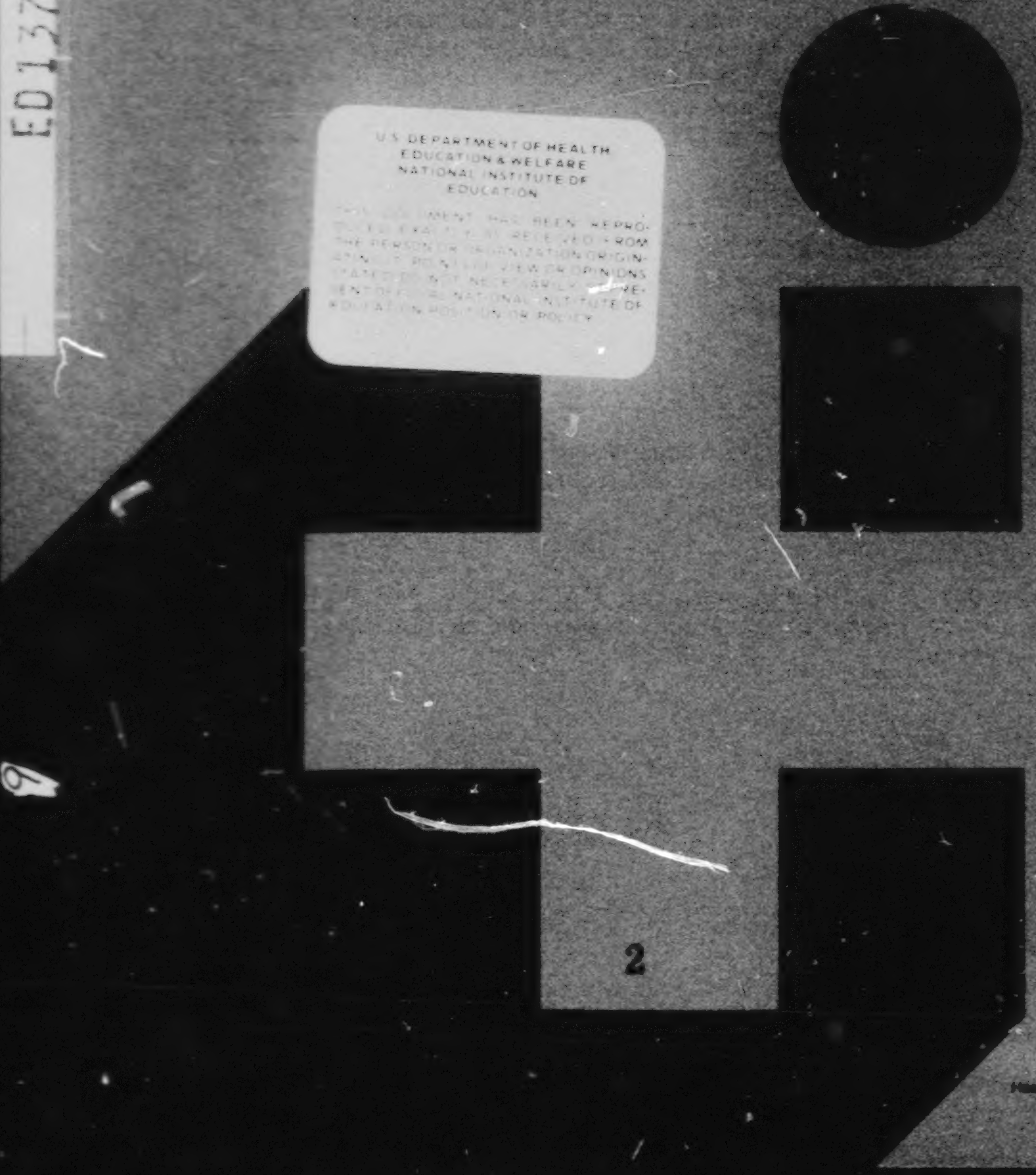

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A Data Acquisition and Analysis Handbook for Health Planners is the fourth publication in the Health Planning Information Series.

A Data Acquisition and Analysis Handbook for Health Planners

Volume II

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FOREWORD

This Handbook has been prepared for the Bureau of Health Planning and Resources Development (BHPRD) by the staff of Purdue University's Health Services Research and Training Program. Its purpose is to provide guidance to data management staff within health planning agencies concerning the assemblage, analysis and application of data for the purposes of health planning and resources development. The development of this publication has been carefully coordinated with other technical assistance efforts supported by the BHPRD. In particular, it is viewed as a sequel to the recently published Guide to Data for Health Systems Planners. Whereas the emphasis in the Guide is on identifying data sources and describing existing and emerging data systems, this document provides much more detailed information concerning practical, step-by-step approaches to data acquisition, analysis and use.

An attempt has been made in the Handbook to provide protocols for research design and data acquisition which are as consistent as possible with current standards of high quality social science research, and which are, at the same time, feasible in light of the limited planning agency resources and the diverse backgrounds of agency staff and board members.

Two approaches were taken to obtain necessary background information for preparation of this report in order that we could best provide material which would expand the research skills of the "typical" health planner, as well as contribute to the state-of-the-art in planning.

First, an attempt was made to ground the recommendations contained in this report in what was actually going on in planning agencies. To this end, nearly 100 individuals who were knowledgeable about health planning data collection efforts were contacted. As a result of these contacts 60 studies conducted in the recent past by Comprehensive Health Planning and other agencies were obtained and thoroughly reviewed. Ten studies of relatively high quality, and representative of the content areas of the information framework developed by the Purdue project staff (see Chapter 1, Section I), were selected for on-site documentation.

Second, in order to approach the task of translating academic standards for research into meaningful guidelines for health planning data compilation and collection activities, the findings, observations, and instructions of experts as published in the literature of several disciplines (health services research, sociology, public health, management sciences, statistics, methods, and medical care administration) were reviewed in depth. The information derived from this activity proved invaluable during the development of this report.

A word is in order concerning the specific audience to which this Handbook is addressed. Primarily for clarity and consistency of presentation, the health planner addressed throughout the document is assumed to be employed in a health systems agency rather than a State Agency. However, it is recognized that several of the studies described might more feasibly be conducted at the State level. Where this is the case, the studies can be adapted for State Agency implementation with a minimum of effort.

It was decided that, for purposes of illustrating the analysis and use of data, concrete examples would be more effective than blank tables. Therefore, an example health service area, called Central HSA, was created using realistic but fictitious data. The most salient demographic characteristics of Central HSA are that it contains a population of approximately two million and that it consists of thirty counties, including four SMSAs. Therefore, Central HSA is above average in size and representative of both rural and urban dwellers.

This publication presupposes the implementation by HSAs of the inventory components described in the companion publication, A Guide to the Development of Health Resource Inventories. Many of the data compilation and collection activities and the analyses described in the Handbook depend upon the completeness of inventory coverage and the accuracy of the information obtained during the process of inventory compilation.

We welcome comments or questions concerning the Handbook. Comments should be directed to: Division of Planning Methods and Technology, Bureau of Health Planning and Resources Development, Health Resources Administration, Parklawn Building, Room 12-14, 5600 Fishers Lane, Rockville, Maryland 20852.

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Resources Development

PREFACE

This publication is divided into four sections. Section I, the Introduction, contains two chapters. The first chapter explains the report's objectives and the second discusses general methodological issues. The remaining sections (II-IV) correspond to the categories of an information framework for health planning (see Chapter 1, Section I). Within each of these three sections, the first chapter discusses the need for the type of data being covered in that section with reference to purposes and uses for the data primarily as required by legislatively defined agency functions. Subsequent chapters detail procedures for generating a portion of the type of data designated by the section title (e.g., in Section III, Chapter 7 describes how to obtain and analyze hospital data which fulfill a portion of the need for health resources data).

All the activities based upon assemblage of extant data are contained in Sections II and III (Volume I); all the studies based upon primary data collection, with the exception of the Study of the Demand for Health Manpower in Hospitals and Nursing Homes, are contained in Section IV (Volume II). A particular temporal execution is dictated neither by the ordering of Sections II through IV with respect to each other, nor by the within-section ordering of chapters. Thus, an agency may very well conduct the study of ambulance services described in Chapter 15 of Section IV before consulting sources of extant data on hospitals (Chapter 7, Section III).

Each chapter is intended to be substantially complete within itself; therefore, a certain amount of redundancy or repetition will be found. On the other hand, cross-references to useful information contained in another chapter or in A Guide to the Development of Health Resources Inventories have been included wherever appropriate.

The within-chapter arrangement of topics differs for Sections II and III, on the one hand, and Section IV, on the other, due to the fact that the former deal with extant data and the latter with primary data collection.

In Sections II and III, the topics contained in each chapter are as follows: selection and definition of data items, description of data sources, and data analysis and use. In Section IV, the topical organization of chapters is necessarily more complex, reflecting the greater complexity inherent in a primary data collection effort. Part I describes the study methodology, covering the definition of concepts and variables, the study instrument, the data collection design, field procedures, and data processing and storage. Part II discusses data analysis and use, usually with reference to specific examples of planning, resource development or project review decisions to be made by HSAs.

Appendices are found at the end of most chapters. These contain supplementary materials such as instructions to data collection personnel, codebooks, and other relevant documentation. When content footnotes are used, they appear at the bottom of the appropriate page. Bibliographic references appear at the end of each section.

ACKNOWLEDGMENTS

The staff of Purdue's Health Planning Data Project, Health Services Research and Training Program, would like to thank specific individuals who contributed to our preparation of this Handbook.

In particular we wish to acknowledge the active support and continuing advice of our Project Officer, Alan R. Boissy of the Bureau of Health Planning and Resources Development, Health Resources Administration. His concern with detail and accuracy has helped to keep high quality continuously before us as a goal to be achieved. Co-Project Officer Robert H. Mugge of the National Center for Health Statistics also has given us valuable assistance.

We also wish to thank Julia A. James, Hyman Luden, Peter D. Mott, Philip N. Reeves, Caesar A. Ricci II, and George E. Schwarz. As consultants to the Health Planning Data Project, these persons have generously given their advice and recommendations concerning health planning data issues.

Our staff acknowledges the help of the above-named individuals while retaining full responsibility for the accuracy of the information contained in this Handbook.

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SECTION IV

HEALTH SERVICES UTILIZATION DATA

Chapter 10

The Need for Health Services Utilization Data

Under the National Health Planning and Resources Development Act (P.L. 93-641), health systems agencies are given the responsibility for planning and developing the necessary health resources that are needed by the residents within their health service areas. The identification of needed health resources will require that HSAs have information concerning the use of health resources by their area's residents. HSAs have, therefore, been required by P.L. 93-641 to "assemble and analyze data concerning...the patterns of utilization of the area's health resources."[1]

Contained in this section of the Handbook are studies pertaining to the utilization of 1) ambulatory care services, 2) hospital inpatient services, 3) nursing home inpatient services and 4) ambulance services. In these four studies of health resource utilization, the data are obtained from the providers of health services. Also included in this section is a study of the utilization of health resources in which the data are obtained from the consumers of health services (i.e., a family health survey).

A. AMBULATORY CARE SERVICES

Three of the ten national health priorities indicated by Congress in P.L. 93-641 that are to receive special consideration in the health planning and resources development programs of HSAs and State Agencies are related directly to the delivery of ambulatory care services. These priorities include 1) "the provision of primary care services for medically underserved populations,... 2) the development of medical group practices,...health maintenance organizations, and other organized systems for the provision of health care, and 3) the training and increased utilization of physician assistants,..."[2]

In addition to the emphasis placed upon ambulatory care services in the legislation, there are several other compelling reasons for the collection and analysis of data concerning the provision and utilization of such services. The most obvious of these reasons is the sheer volume of utilization of such services. According to National Center for Health Statistics data, during 1974 there were over one billion visits to medical doctors, excluding visits to patients in the hospital—an average of 4.9 visits per person.[3] The largest proportion of these visits occurred in private physicians' offices. However, recent trends have indicated dramatic growth in both the provision and utilization of ambulatory care services in the nation's hospitals: in 1953, 60 percent of all community hospitals reported outpatient visits; by 1972 the number had increased to 95 percent.[4] Furthermore, outpatient services represent an increasingly large proportion of the services provided by hospitals. According to the American Hospital Association (AHA), the number of outpatient visits to community hospitals increased over 100 percent from 1963 to 1973, while the number of inpatient admissions over the same period increased 25 percent. In 1953, there were two outpatient visits for every inpatient admission; by 1973 the ratio had increased to five to one.[5] Thus, "outpatient services of the modern hospital now constitute one of its principal components, needed and demanded by both patients and physicians, an indispensable aspect of community health services...."[6]

It is clear then, that ambulatory care services represent an important part of the current health care delivery system, and that hospitals are rapidly becoming significant deliverers of ambulatory care. The study described in Chapter 11 is intended to provide HSAs with information of ambulatory care services in physicians' offices and hospital outpatient departments. With such information, HSAs will be able to assess the availability and productivity of the providers of ambulatory care services and the utilization patterns of the consumers of these services. Such information, furthermore, can be used by HSAs in the estimation of needed ambulatory care services for purposes of project review. Techniques for the analysis and use of ambulatory care data for these purposes are contained in Chapter 11.

B. HOSPITAL AND NURSING HOME INPATIENT SERVICES

The primary purpose to be served by the studies described in Chapters 12 and 13 is the provision of data to HSAs which will enhance rational decision-making regarding hospital and nursing home inpatient services utilization during the planning, resource development and project review activities mandated for these agencies by P.L. 93-641.

Tasks specifically required of HSAs by P.L. 93-641 include the assemblage and analysis of data on their area's health services delivery system and the use of the system's resources by their service area's residents;[7] determination of the need of the residents for additional services,[8] and explication of the patterns of use of inpatient services, including the geographic location of users (i.e., patient origin data).[9] Execution of these tasks could well be partially based upon data obtained from conducting a hospital and nursing home inpatient utilization study such as the ones described in Chapters 12 and 13.

Furthermore, P.L. 93-641 specifies that HSAs are to give priority consideration to the promotion of activities to achieve improvements in the quality of health services.[10] Each HSA, therefore, is required to coordinate its activities with each Professional Standards Review Organization (PSRO) in its health service area.[11] The emphasis in these studies of inpatient services utilization upon length of stay, a traditional measure of appropriateness of care, indicates an area where HSAs and PSROs share the same concerns.

PSROs are mandated, under the Social Security Amendments of 1972 (P.L. 92-603), to apply norms of care to institutionalized persons whose health care costs are reimbursable under Titles V, XVIII and XIX of the Social Security Act. Such norms are to be based upon patterns of medical practice in the PSRO region, such as "typical lengths-of-stay...by age and disgnosis."[12]

Meeting legislative requirements is a compelling reason for the conduct of the studies in Chapters 12 and 13. However, it should be pointed out that the requirements themselves reflect concerns, amply justified in the literature, regarding the costs represented by the inpatient care sector of the health services delivery system. Expenses per patient day for community hospitals, for example, have been rising sharply since 1950,[13] and the federal government has become increasingly involved as a third-party in the reimbursement of a portion of these costs. Therefore, the concern for cost containment reflected in both P.L. 93-641 and P.L. 92-603 is easily understood.

The following statistics, furthermore, give some idea of the magnitude of non-federal short-stay hospital inpatient utilization: in 1972, 7,407 hospitals discharged 31.6 million patients.[14] These patients had consumed 245.1 million days of care and had an average length of stay of 7.7 days per hospital episode.[15] Concerning nursing home utilization, in 1973-74, 16,100 nursing homes discharged nearly one million patients.[16]

Reducing unnecessarily long hospital and nursing home stays, and preventing the construction of additional hospital and nursing home beds which are not needed, are two actions which can be taken for the purpose of controlling costs. The influence of PSROs will be most strongly felt upon the former action, while HSAs have primary responsibility for the latter type of action through project review. HSAs will also, however, be in a position to provide PSROs with data on length of stay which can be used as regional norms for making determinations of what constitutes an "excessive" stay.

Data from the studies in Chapters 12 and 13 will provide useful information for purposes of:

1) describing the area's patterns of hospital and nursing home inpatient utilization which takes into account such factors as use by age, by sex, by significant diagnostic categories, by hospital size, by type of service, etc;

2) identifying the geographic origin of the patients who utilize the area's hospitals and nursing homes;

3) estimating regional and, where population size permits, sub-regional lengths of stay by age and diagnosis for the purpose of establishing norms for PSROs and for use in project review decisions; and

4) estimating the number of hospital and nursing home beds which will be needed in the health service area based in part upon current numbers of discharges and lengths of stay.

C. AMBULANCE SERVICES

The primary purpose of the study described in Chapter 14 is to provide HSAs with the necessary data and information to execute their planning, resource development and project review responsibilities regarding the provision of ambulance services in their service areas. The planning, resource development and project review responsibilities of HSAs regarding ambulance services, and the concomitant data and informational requirements to fulfill these responsibilities, are specified in two federal laws—P.L. 93-641 and the Emergency Medical Services Systems Act (P.L. 93-154).

Because ambulance services are part of an area's health resources, HSAs will be required under P.L. 93-641 to assemble and analyze data concerning 1) the number, type and location of the area's ambulance providers, including their services, personnel, vehicles and equipment and 2) the use of ambulance services by the area's residents.[17] Under the Emergency Medical Services Systems Act, HSAs must collect and analyze data for purposes of review and comment. This act provides funding in the form of grants and contracts for the purpose of planning, operating, expanding and improving emergency medical services systems, but requires that applicants for such grants and contracts submit their applications to state and areawide health planning agencies for the purposes of review and comment before submitting them to the Secretary for approval.[18] To effectively review and comment upon applications which propose to provide ambulance services (a major link in an area's total emergency medical services system), HSAs must have current data with which to assess the adequacy of the ambulance services presently provided to the residents of the service area. Furthermore, each applicant under P.L. 93-154 must give assurance that the prospective emergency medical care project will be conducted in cooperation with each areawide health planning agency whose health plans cover the service area of the proposed project.[19] In order for HSAs to effectively participate in the cooperative planning and implementation of projects to provide needed ambulance services, data which can be used to assess the efficiency in the present delivery of services, and to estimate the need for future services must be collected and analyzed.

Apart from these legislative requirements, the need to conduct studies of ambulance services is attested to by the severity and magnitude of the health problem such services are intended to ameliorate. The greater the severity and magnitude of a particular health problem, the greater the need for a study of the related health services. The severity of the problem of accidental death and injury has been succinctly stated in a report by the National Academy of Sciences:

> In 1965, 52 million accidental injuries killed 107,000, temporarily disabled over 10 million and permanently impaired 400,000 American citizens at a cost of approximately $18 billion. This neglected epidemic of modern society is the nation's most important environmental health problem.[20]

The magnitude of the problem is evident in the fact that in 1973, deaths from accidents were the fourth leading cause of death in the United States, and accidental injury was the leading cause of death among all persons aged 1 to 34.[21]

The importance of such criteria in determining the need for an examination of ambulance services lies in the consistency with which studies have demonstrated that deaths resulting from certain illnesses and accidents might be averted if prompt emergency medical care of high quality is available. Frey and associates, for example, examined deaths resulting from automobile accidents and suggested that 18 percent of such deaths were "salvageable" had the victims received emergency medical care of higher quality.[22] Huntley has estimated that if appropriate emergency medical services were delivered promptly to the victims of accidents and certain illnesses, such as myocardial infarction and stroke, about 60,000 lives could be saved annually.[23] Similarly, the American Heart Association has estimated that approximately 10 to 20 percent of the 275,000 prehospital coronary deaths could be prevented if proper care were administered at the scene and en route to a medical facility by the medical personnel who provide emergency ambulance services.[24]

The ultimate goal of HSAs is to improve the health of the residents in their service areas. The evidence in the literature suggests that HSAs can contribute toward this end by improving their area's ambulance services. Two mechanisms, project review, and resources development through the administration of grants and contracts provide the opportunity to do so. In both cases, however, HSAs will need appropriate information about the ambulance services in their areas. The required information can be obtained by conducting a study such as the one described in Chapter 14.

Data from the study in Chapter 14 will provide useful information for purposes of:

1) describing the essential structural and service components of the ambulance system;
2) evaluating the extent to which the system and its components meet federal specifications and quidelines regarding vehicles, equipment and personnel; and
3) evaluating the performance of the system and its components.

It is entirely possible that various HSAs will have other purposes or objectives than those noted above. For example, state or local regulations may be pertinent, or area conditions may dictate an emphasis on certain specific aspects of the system that entails greater depth of analysis than is possible with the data that would be obtained by implementing the study in Chapter 14.

In order to outline added objectives or further delineate specific areas of interest a period of planning is required. This should include a review of pertinent research literature, a review of any relevant state or local regulations, and a thorough examination of the federal laws, specifications and guidelines regarding emergency medical services. The primary sources of this latter information are noted below:

- Public Law 93-154, "Emergency Medical Services Systems Act of 1973."
- Public Health Service, DHEW, "Grants for Emergency Medical Services Systems: Program Regulations" Federal Register, Vol. 39, No. 127, Part III, July 1, 1974, pages 24303-24313.
- Public Health Service, DHEW, Training of Ambulance Personnel and Others Responsible for Emergency Care of the Sick and Injured at the Scene and During Transport. DHEW Publication No. (HSA) 74-2027, January 1974 (Formerly PHS Publication No. 1071-C-4, April 1970).+
- General Services Administration, Federal Specification, Ambulance, Emergency Medical Care Vehicle. KKK-A-1822, Federal Supply Service, January 2, 1974.+
- Public Health Service, DHEW, Advanced Training Program for Emergency Medical Technicians - Ambulance. DHEW Publication No. (HSA) 74-2007, January 1974.+
- Public Health Service, DHEW, Medical Requirements for Ambulance Design and Equipment. DHEW Publication No. (HSA) 74-2035, January 1974.+
- Subcommittee on Pre-hospital Emergency Services, Committee on Trauma, "Essential Equipment for Ambulances," Bulletin, American College of Surgeons, May 1970, pages 7-13.+

Single copies of the sources noted by the symbol (+) are available free of charge from:

Division of Emergency Medical Services
Suite 320
Presidential Building
6525 Belcrest Road
Hyattsville, Maryland 20782

In addition, the HSA should assemble any presently available information on local ambulance services — perhaps a state plan, studies conducted by other health planning groups such as local EMS councils, etc., and such minimal extant facility and demographic data as population by county, the location of hospital emergency rooms, etc.

D. FAMILY HEALTH SURVEY

In the final chapter of this section of the Handbook is a methodology for conducting a family health survey. Of all the studies presented in this Handbook, the family health survey will be the most difficult to conduct. The family health survey will probably also be the most expensive. HSAs, therefore, should carefully consider the complexity and costs involved in conducting a family health survey before such a study is undertaken.

The family health survey provides HSAs with data and information concerning the health status of their service area's residents. The collection and analysis of health status data by HSAs are specifically required under P.L. 93-641.[25] As was discussed in Chapter 5 of Section II, there exist very limited health status data at the local level, and one way of obtaining such data is to conduct a family health survey.

The family health survey described in Chapter 15 was not designed to provide data about specific health problems in the community or particular population subgroups, since this is a costly procedure. This survey will only provide gross estimates of the extent of disability among the residents of a health service area. Such estimates, however, can provide HSAs with important information concerning the "need" for health services among their area's residents.

The family health survey is also intended to provide data that can be used in estimating the use of health services. The survey is specifically designed so that the use of health services, measured by the number of times a person visited a physician, can be related to the need for health services, indicated by disability days. This relationship, which can be measured in terms of a use/need discrepancy ratio, can be related to characteristics of the population such as income, race and place of residence.

When used as a measure of access to health services, the use/need discrepancy ratio deviates from the traditional approach of using utilization of services alone. "Since the use of health services is highly related to the prevalence of illness, differences in amount of utilization may simply reflect different levels of health, not access. Therefore, a more appropriate index of access is the ratio (or discrepancy) of use to need for services, which standardizes the use of services for the effects of illness."[26]

In addition to providing information concerning the amount of unmet need among various population subgroups (i.e., these subgroups with lower than average use/need discrepancy ratios) the family health survey is also designed to provide information concerning the barriers to access among these subgroups. Among the responsibilities given HSAs under P.L. 93-641 is the responsibility to increase the accessibility (including overcoming barriers) to health services among the residents in their service areas.[27] Identification of the barriers to health services utilization is the necessary first step in the fulfillment of that responsibility.

While the data from a family health survey have a variety of uses in health planning and resources development, the uses presented in Chapter 15 are limited to:

1) describing the patterns of disability among the residents of a health service area;

2) assessing the relationship between the use and need for health services, and estimating the amount of unmet need among the various population subgroups; and

3) identifying the barriers to health services utilization.

Although the family health survey described in Chapter 15 is modeled after the surveys conducted by the Experimental Health Services Delivery Systems, it is much narrower in scope. The basic EHSDS survey instrument was shortened considerably in order to reduce its complexity and, more importantly, the costs associated with its implementation. By doing so, however, certain components of the EHSDS questionnaire had to be dropped, most notably, questions pertaining to hospital utilization and health insurance coverage.

Before conducting the survey described in Chapter 15, the EHSDS survey instrument should be examined by the HSA for possible additions and/or other changes to the survey instrument included in Chapter 15. An examination of the health interview survey instruments utilized by the National Center for Health Statistics should also be examined by the HSA for possible inclusion of supplemental questions. The following sources will be helpful for these purposes:

EHSDS Household Health Survey

1) Robert L. Eichhorn and Andrew M. Kulley, Health Services Data System: The Family Health Survey. June 1972; available from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Va. 22161.
2) Andrew M. Kulley, Paul Duncan and Cheryl A. Maurana, Codebook for the Household Health Survey (Revised). October 1975; available from NTIS.

NCHS Health Interview Survey

1) NCHS, "Health Survey Procedure: Concepts, Questionnaire Development, and Definitions in the Health Interview Survey," Vital and Health Statistics. Series 1, No. 2, PHS Publication No. 1000, May 1964.

2) NCHS, "Health Interviewer Survey Procedure" 1957-1974," Vital and Health Statistics. Series 1, No. 11, DHEW Publication No. (HRA) 75-1311, April 1975.

Chapter 11

A Study of the Utilization of Ambulatory Care Services

I.
STUDY METHODOLOGY

The study described in this chapter represents a method whereby an HSA can gather and analyze data referring to the utilization of ambulatory care in various settings within the health services delivery system. The study is divided into parts which refer to the settings in which the majority (93 percent) of all ambulatory care takes place, i.e., physicians' offices, hospital outpatient departments and emergency rooms.[1]

Definition of Concepts

Several concepts to be utilized in the data collection and analysis described below require definition. It is possible that an HSA may find it necessary to use different definitions than those provided. If so, special attention should be paid to the consistency issues discussed in Chapter 2 of Section I. The following definitions of concepts will be used in this study:

> ·Ambulatory Care: "health services rendered individuals not in a hospital or other health care institution. These services, for the largest part, fall under the category of primary care...(and do) not include secondary and tertiary-level care provided hospital inpatients or lay services given outside formal health care systems.
>
> Ambulatory care takes place in many settings, from patients' homes, neighborhood health centers and public clinics to hospital outpatient departments and emergency rooms. However, the largest volume of ambulatory care in this country is provided at the doctor's office."[2]

Given this definition of ambulatory care, it is clear that several units of analysis might conceivably be useful in examining this portion of the health services delivery system. Ambulatory care patients, providers of ambulatory care, etc. are obvious examples. In order to enhance comparability and an expansion of the data base, the various portions of this study emphasize the ambulatory encounter as the fundamental (but not exclusive) unit of analysis.

- Ambulatory Encounter: "a face to face contact between a patient and a provider who has primary responsibility for assessing and treating the condition of the patient at a given contact and exercises independent judgement in the care of the patient."[3]

The term "provider" includes physicians and nurses or other persons acting under a physician's supervision. This definition of ambulatory encounter is consistent with that utilized in the National Ambulatory Medical Care Survey (NAMCS), but not consistent with that utilized in the National Health Interview Survey (i.e., "physician visits") which includes telephone contacts as encounters.*

Because the schematic division of this study refers to the settings in which ambulatory encounters take place, each of the three settings discussed merits careful definition.

- Physician's Office: according to the NAMCS, "offices are premises which the physician identifies as a location for his ambulatory practice. Responsibility over time for patient care and professional services rendered there resides with the individual physician, rather than an institution."[4] This definition includes free-standing clinics.

For purposes of this chapter, physicians are defined as all licensed federal and non-federal doctors of medicine (M.D.) and osteopathy (D.O.), including interns and residents, who are engaged in the practice of medicine or surgery in a health service area. Physicians who reside in a health service area but are inactive are not included.

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*A more detailed comparison of these definitions is presented in Medical Care, Vol. 11, no. 2 (supplement) 1973, p. 27.

- Hospital Outpatient Department: "An organized unit of a hospital, with facilities and medical services exclusively or primarily for those patients who are generally ambulatory and who do not require or are not currently receiving services as an inpatient of the hospital. These services are usually offered or are available on a scheduled basis."[5]

- Hospital Emergency Department: "a hospital outpatient care unit for the provision of medical services that are urgently needed to sustain life or prevent critical consequences and that should be performed immediately."[6]

Hospitals include all establishments with an organized medical staff, with permanent facilities that include inpatient beds, and with medical services, including physician services and continuous nursing services, to provide diagnosis and treatment of patients.[7]

While the primary unit of analysis in this study will be the ambulatory encounter, the use of settings to differentiate parts of the ambulatory care system requires that the HSA either have, or collect, certain data about such settings prior to gathering encounter data. In the case of ambulatory care in physicians' offices, this preliminary data will provide: 1) descriptive information about all physicians in the HSA, 2) the necessary information to impose the definitions noted above, 3) a basis for reaching appropriate sampling decisions, 4) information useful in estimating the impact of noncooperation during the subsequent study, and 5) information of practical value in implementing the collection of encounter data (e.g., size of practice, number of assistants, etc.). An analogous preliminary survey of outpatient departments will serve similar functions. Each of these preliminary data collection efforts is described separately, while the ambulatory encounter survey, which is essentially constant regardless of setting, is discussed only once.

Part 1. The Physician Survey

A technique to be utilized in the development of an inventory of area physicians is described in A Guide to the Development of Health Resource Inventories. Although this serves a variety of purposes, it does not incorporate many of the data required to begin implementation of an ambulatory care study. Such an inventory will, however, provide a necessary mailing list and should be completed prior to the implementation of the Physician Survey described here.

A. Definition of Variables

Since the Physician Survey has a variety of functions including the analysis of resulting data for their substantive value as well as their utilization in subsequent study procedures, the variables must be selected with care. Every attempt should be made to restrict this data collection to minimal essential variables. The following are suggested.

- physician identification: to be specified in terms of name and address of practice, including zip code, as well as a unique identification number.
- current practice: to be specified simply as whether or not the physician is currently engaged in the practice of medicine. For those not so engaged, the determination of whether this is because they are retired or due to some other reason is made. The following variables refer only to those physicians who currently practice medicine or osteopathy regardless of whether or not they provide direct patient care.
- primary specialty: specified as the specialty in which the physician spends the largest percentage of his/her time.
- date of birth: specified as the month and year of the physician's birth.
- federal employment: whether or not the physician is employed by the U. S. government, if so, which type.

- current professional setting: three categories are to be specified: 1) office based practice, including clinics not affiliated with a hospital; 2) hospital based practice, including hospital outpatient departments; and 3) other professional setting, including nursing homes, pharmaceutical companies, research organizations, etc. While some physicians may devote various portions of their time to more than one of these, they should specify that which represents the largest percentage of their time.

- type of office based practice: this refers only to those physicians who define their current professional setting as "office based practice". Categories include solo practice, two-man partnership, and group practice. For the latter category the number of members of the group should be specified.

- type of hospital based practice: this refers only to physicians who previously defined their practice as hospital based and differentiates interns, residents, and medical staff.

- new patients: whether or not the physician whose practice is office based can accept new patients.

- auxiliary medical staff: for those physicians who specify that their practice is office based, the number of auxiliary medical personnel by type should be specified in full-time equivalents. Registered physician assistants, RNs, LPNs, nurses' aides, x-ray, lab and medical technicians should be included, but secretarial, clerical and administrative personnel should be excluded.

- weeks practiced in last calendar year: to be specified as the number of weeks, excluding vacations, professional meetings, etc.

- hours practiced in last complete week: to be specified in terms of the total number of hours during the physician's last complete week of practice. "On call" hours when the physician did not actually provide services should be excluded.

- hours in direct patient care: to be specified as the number of hours in the previous complete week of practice which were spent in direct patient care. This should include such related activities as interpreting x-rays, and lab tests, but exclude administrative work, record keeping, etc.

- visits: referring to the same preceding complete week of practice, the number of each of four types of patient contacts should be ascertained. The categories are 1) office visits (excluding telephone contacts); 2) hospital inpatient contacts; 3) hospital emergency room or outpatient department contacts; and 4) other patient contacts (including telephone contacts, house calls, etc.)

B. Study Instrument

The above data can be gathered through the use of an instrument like that presented below. It is amenable to pre-coding if the number of physicians in the HSA is of a size that prohibits hand tabulation from returned forms.

PHYSICIAN SURVEY FORM

John A. Doe, M.D.
123 Vine Street
City, State, 12345

If the name/address printed at left is NOT correct, please make appropriate changes at right

____
____
____

Are you currently engaged in the practice of medicine, or ostepathy? (includes direct patient care, administration, teaching, research, etc.)

☐ *yes* ☐ *no* → ☐ *retired* / ☐ *other* → *please place questionnaire in enclosed envelope and return*

1. What is your primary specialty? (i.e., the speciality in which you spend the largest percentage of time.) ______________________

2. What is your date of birth? ______ / ______ (month / year)

3. Are you employed by the U.S. government? ☐ no ☐ yes → ☐ U.S. Public Health Service
☐ other (e.g., Veterans Administration, U.S. military)

4a. Which of the following best describes your present practice?

☐ office based practice (includes clinics not affiliated with a hospital) ☐ solo ☐ two-man partnership ☐ group number in group ___	☐ hospital based practice (includes hospital outpatient departments): ☐ intern ☐ resident ☐ medical staff	☐ other (includes nursing homes, insurance and pharmaceutical companies, medical schools, etc.)

If you checked "office based practice" in Question 4a above, please answer Questions 4b and 4c below:

4b. Are you currently able to accept new patients? ☐ yes ☐ no

4c. How many full-time equivalent auxiliary MEDICAL personnel of the following specified types do you currently utilize in your practice? Convert part-time employees to full-time equivalents on the basis of hours worked.
registered physician assistants: ______
other MEDICAL personnel (INCLUDE RNs, LPNs, nurses' aides, x-ray, lab and medical technicians; EXCLUDE secretaries, receptionists, etc.): ______

5. How many weeks did you practice in 1976? (EXCLUDE medical meetings, vacations, holidays, and similar absences from practice.) number of weeks ______

6. How many total hours did you practice during your most recent COMPLETE week of practice? (EXCLUDE "on call" hours not actually worked.) number of hours ______

7. How many of these hours were spent in providing DIRECT patient care or patient related services? (INCLUDE patients' lab tests, interpreting x-rays, etc.; EXCLUDE administrative tasks, etc.) number of hours ______

8. During your most recent COMPLETE week of practice, how many of the following types of patient visits did you have?
office (EXCLUDE telephone) ______ visits
hospital (inpatient only) ______ visits
hospital (ER and OPD) ______ visits
other (telephone, house calls, etc.) ______ visits

THANK YOU. PLEASE PLACE QUESTIONNAIRE IN ENCLOSED ENVELOPE AND RETURN.

C. Data Collection Design

The most efficient data collection design would appear to be a mailed survey technique with intensive follow up efforts. The unit of analysis is the physician, and because one of the major uses of this data set is its value as a potential sampling frame, a complete census of physicians is required.

D. Field Procedures

Pretesting

The instrument should be pretested with some care, since maximal response rates and complete information are critical to the value of this data file. This can be best handled by requesting the assistance of a small number of physicians whose practices are of various types and with whom the HSA has cordial relations. Their advice on the clarity and ease of completion of the instrument can be a valuable aid in making revisions which will enhance the cooperation of their colleagues.

Procedures to Elicit Study Participation

Given the need for a complete census of physicians and the substantial negative implications of non-response in such a situation, the HSA should be prepared to devote considerable time and effort to gaining the cooperation of physicians. This may include the solicitation of endorsement from county, regional or state professional associations. The difficulty with this approach, however, is that if such organizations refuse to endorse the study the HSA is placed in an obviously difficult position. It may, therefore, be more prudent to simply inform professional groups and accept any agreement to cooperate or assist in the study that is forthcoming.

Primarily, the elicitation of cooperation from the individual physician should be approached through two mechanisms. First, the instrument should be mailed with a very carefully worded cover letter, outlining the importance of their cooperation, the fact that the information will be held in confidence and so forth (see Appendix A). An addressed and stamped return envelope should be provided. Second, the HSA should be prepared to use a second (and possibly a third) mailing to physicians who do not return completed instruments within a specified period of time. Following these mailings all remaining physicians should be contacted by telephone and an attempt to gather the required information by way of a telephone interview should be made. Obviously, those individuals who have not cooperated in the face of several follow-up requests will be reluctant to do so. As a result, the HSA staff member who is given the responsibility of making these telephone contacts should be selected with care—if the number of required calls is small, a senior staff person might wish to perform this task. This method of intensive call-back requires that the HSA maintain careful records of the physician's responses. A log sheet system such as that described in the Study of Ambulance Services (Chapter 14 in this section) is one method of doing this.

Quality Control

The HSA will want to insure that the data which are collected are as complete and accurate as possible. Part of this effort takes place during the pretest and instrument development phases when the HSA attempts to make the instrument as clear and concise as possible. In addition, such instructions as are necessary for its completion should be provided. If possible these should be incorporated on the instrument itself.

The receipt and checking of returned instruments should be assigned to one staff member who is thoroughly familiar with the instrument and the research objectives (more than one person may be necessary in HSAs where there are a very large number of physicians). This individual will have the responsibility of checking the completeness and internal consistency of each returned form and making any necessary telephone contacts to resolve any problems. If the data are to be coded and stored on a machine readable medium it will be most efficient if the same individual has the responsibility of supervising the coding and keypunching operations.

The date when the Physician Survey is fielded is another factor which could influence the quality of data. Because of the tendency for respondents to use the week prior to receipt of the survey form as the "most recent COMPLETE week of practice," it is important to field the survey during a period when the prior week is free from holidays, e.g. July 4.

E. Data Processing and Storage

In those HSAs with relatively large numbers of physicians, the data from the Physician Survey will be most efficiently handled if they are coded and punched onto cards. A suggested codebook is outlined in Appendix B of this chapter. Keypunching should be verified.

Part 2. Hospital Outpatient Department Survey

Hospital outpatient departments are becoming an increasingly important source of ambulatory care.[8] As a result, this source of care must be considered in order to increase the extent to which an HSA can describe and analyze the utilization of ambulatory care in its health service area. Again, a two-step study procedure is suggested; however, the first component is notably less formalized than was the case in the Physician Survey.

The preliminary survey described here will provide an opportunity to determine whether or not the outpatient department should be included in the planned survey, and to gather certain minimal information concerning approximate patient load, personnel, etc. It will also provide an opportunity to begin the process of establishing rapport with the relevant hospital administrative personnel and thereby enhance cooperation.

A. Definition of Variables

The following five variables make up this preliminary data file on hospital outpatient departments:

- nature of outpatient department: whether or not the hospital has an outpatient department, and if so, whether or not it is structured in a way that is consistent with the definition of such departments.
- hours of operation: the precise days and hours of operation of the department should be obtained. This information will be used in estimating the cost of actual data collection and the number of personnel likely to be involved. It is also an important datum in its own right, to be used in estimating the need for outpatient facilities.
- personnel: the number of full-time equivalent professional staff members including M.D.s, registered physicians assistants and other (i.e., RNs, LPNs, nurses' aides, x-ray, lab and medical technicians).
- rooms: the number of treatment/examination rooms in the department. (These data will be gathered only at this time

and represent a critical component in the methodology suggested for estimating the need for outpatient facilities).

- visits: the annual number of outpatient department visits.

B. Study Instrument

The following tabular instrument provides a convenient means of recording the above data. Since these data will typically be collected, stored, and analyzed using only the instrument, it should be as clear as possible and the data should be recorded in a constant format for each hospital.

Hospital Outpatient Department Survey Form

1. Hospital: ____________________

2. Nature of outpatient department:

____

____

____

3. Hours:

hours	days
______ to ______	______ to ______
______ to ______	______ to ______

4. Personnel:

number of:	full-time equivalent
MDs	
registered physician assistants	
other	

5. Number of treatment/examination rooms: ______________

6. Annual number of outpatient department visits: ______________

7. Name of respondent: ____________________

C. Data Collection Design

These data will be collected by means of a telephone survey of hospitals. The universe of interest is all hospitals which are located in the HSA and which have outpatient departments (as defined earlier). All such hospitals are to be surveyed.

D. Field Procedures

The simplicity of the instrument and the informal nature of the data collection procedures render pretesting irrelevant. Cooperation is elicited by devoting appropriate care to insuring that contacts are cordial. A single study staff member will perform all of the data collection and will, therefore, need only minimal training.

Data Collection Procedures

The collection of data will begin by drawing up a list of hospitals which are presumed to be members of the relevant universe. This is achieved by deriving a tentative list from the most recent issue of the American Hospital Association's Guide to the Health Care Field. The list will contain the name of each hospital (and its administrator in the HSA which has an outpatient department according to the definition used by AHA. The list should then be updated with the addition of new hospitals (opened since the survey which provided data for the most recent AHA Guide) or hospitals which have recently added an outpatient department. The final list of relevant hospitals will be determined after the survey.

Each of the listed hospital administrators will be contacted by telephone (probably by the study director or other senior staff member) and the necessary data obtained. In addition, the administrator should be asked to forward to the HSA blank copies of all outpatient department record-keeping forms.

A second purpose of this contact is the establishment of some minimal level of rapport between the study staff the administrators. The local situation (pertinent issues, etc.), the newness of the HSA, and its research reputation will all influence the precise method whereby this can be achieved. It is assumed that the study director will have enough experience and familiarity with the local situation that discussions of issues of mutual interest can be interspersed with the gathering of the required information.

It should be noted that there is a basic research decision regarding encounter data that must be reached before actual data collection can begin, but which cannot be made until sometime after this initial telephone contact. This is the choice between primary data collection and record abstraction. It is possible (but not likely) that each relevant hospital already collects all of the encounter data of interest to the HSA. A content analysis of the blank record forms requested in the telephone contact will indicate whether or not this is the case. If so, the HSA should examine carefully the possibility of selecting an adequate sample of such records and abstracting the information required. This approach requires that all the required information is part of the record, and that the records are identifiable and accessible. Because of variation in record-keeping procedures, and the requirement for data not typically part of hospital records, it is considered unlikely that the abstraction process will become a viable option. If the approach does appear to be useful, procedures for the collection of the data would be similar to those described in Chapter 3 of this section, A Study of the Utilization of Hospital Inpatient Services.

E. Data Processing and Storage

It is assumed that the Hospital Outpatient Department Survey data will be collected and stored on the single form presented above. No coding or data processing is likely to be required.

Part 3. Ambulatory Encounter Data

Following completion of the Physician and Hospital Outpatient Department Surveys, the HSA will be in a position to proceed with the collection of ambulatory encounter data. Obviously, many of the data collected in the preliminary surveys will be utilized in both planning and implementing this component. For example, "the type of practice" data from the Physician Survey will have an impact on decisions regarding the techniques most valuable in the actual data collection, and the specialty and number of visits data may become important as stratification variables or for comparing a sample to the universe of physicians as a check on the representativeness of the sample. In sum, since the ambulatory encounter data which are to be collected are under the control of the physicians and outpatient department personnel, the preliminary survey data will be of great value in developing the precise strategy of data collection in this component.

A. Definition of Variables

The ambulatory encounter data to be collected in this component of the study are embodied in the following variables. They have been selected and defined in a manner that is as consistent as possible with other available data — notably that of NCHS. The relatively small number of variables also enhances the extent to which similar data can be collected in diverse settings.

- date of visit: to be specified as the day, month and year when the ambulatory encounter occurred.
- address of patient's residence: to be specified in detail including street address, city or town or other address as appropriate. The zip code must be included.
- patient's birth date: to be specified as to month, day and year.
- patient's sex.

- patient's race: to be specified in terms of three response categories, white, black and other.

- expected principal source of payment for the visit: where only one source of payment is to be specified by checking the appropriate category from among the following:

    - Workman's Compensation
    - Medicare
    - Medicaid
    - CHAMPUS
    - other government payment
    - Blue Cross
    - Blue Shield
    - insurance company
    - prepaid group or health plan
    - medical foundation
    - self pay
    - no charge
    - other

The "principal source of payment" refers to the single source which the patient expects to cover the largest proportion of the charge for the visit. The "other" category may become particularly significant in certain locations. In such cases, it can be sub-divided into further categories as appropriate.

- major reason(s) for the visit: to be specified by the provider and reflect his perception of the reasons for the visit. The following fourteen categories are provided and any number can be checked:

    - acute problem
    - acute problem, follow-up
    - chronic problem, routine
    - chronic problem, flare-up
    - prenatal care
    - postnatal care
    - postoperative care

well adult/child exam
family planning
counseling/advice
immunization
referred by other physician/agency
administrative purpose
other

- principal diagnosis, this visit: to be defined and expressed by the provider. It should reflect the health problem that is most significant in terms of the procedure carried out and the care provided at this encounter. The diagnosis will be written out in longhand in a space provided on the instrument.

- treatment/service ordered or provided, this visit: to be specified by the provider by checking all applicable categories from the list provided. The following categories are utilized:

none ordered/provided
general history/exam
lab procedure/test
X-rays
injection/immunization
office surgical treatment
prescription drug
non-prescription drug
psychotherapy/therapeutic listening
medical counseling/advice
other

- disposition: to be specified by checking all of the following options that are appropriate.

no follow-up planned
return at specified time
return if needed, P.R.N.
telephone follow-up planned
referred to other physician/agency
returned to referring physician
admit to hospital
other

B. Study Instrument

The instrument to be utilized in collecting the above data is a slightly modified version of that developed by NCHS for use in the National Ambulatory Medical Care Survey (NAMCS). The selection of this instrument was based on two valuable attributes of that form. Obviously, by using a similar form, the issue of maintaining comparability across data sets is addressed. The HSA will be able to link these data with those which describe other ambulatory care without great difficulty, and will ultimately be able to effect meaningful comparisons.

A second, and equally important reason for selecting this instrument is that it allows the HSA to take advantage of the massive effort devoted by NCHS to the development, testing and refining of the form. Over the period from 1967 to 1972 various public and private organizations worked to define critical variables, design useful and efficient instruments, field test a variety of potential forms and analyze the results of these feasibility studies.[9] Subsequent to this period, data collection from successive national samples of physicians has been continuing. The emergent national data base is yet another reason for collecting data which provide the potential for comparative analysis.

The modifications that have been implemented here involve the deletion of five questions from the NAMCS forms. Each of these was considered of questionable utility for planning purposes. In addition to these deletions two questions have been added: a request for detailed address information, and a question to determine the expected principal source of payment. The former will be useful for geocoding and analyses of service area and patient origin patterns. The latter is included because it is part of what is currently considered the "minimum" ambulatory care data set.[10] The recommended instrument follows. It has been pre-coded (i.e., instructions for keypunching the data are incorporated on the instrument itself). These instructions are part of each question and represent the appropriate punches (beside each response category), the column location (in square brackets) and the code to be inserted when no data are present (R). The instruments provided to each physician should be stamped with the same physician identification number assigned during the Physician Survey, and those used in hospitals should be similarly identified. The arbitrary patient ID codes should not be duplicated. Physician's office patients must be provided with ID numbers that are not the same as those used in the hospital component.

Physician or
Hospital ID

Ambulatory Encounter Form

Part A: (To be completed in reception area. Please print the address information.)

1. Date of visit:

___/___/___
day mon year

[10-14]/R=99999

2. Residence:

Street Address
number street name
City
Zip Code

3. Date of birth:

___/___/___
mon day year

[15-20]/R=

4. Sex:
1__male
2__female

[21]/R=9

5. Color or Race:
1__white
2__black
3__other
4__unknown

[22]/R=9

6. Expected principal source of payment for this visit. (check 1 box only)

01__Workman's Compensation
02__Medicare
03__Medicaid
04__CHAMPUS
05__other government payment
06__Blue Cross
07__Blue Shield
08__insurance company
09__prepaid group or health plan
10__medical foundation
11__self pay
12__no charge
13__other

[23-24]/R=99

Part B: (To be completed by provider. Please write as legibly as possible.)

7. Major reason(s) for this visit (check all major reasons)

1__acute problem
1__acute problem, follow-up
1__chronic problem, routine
1__chronic problem, flare-up
1__prenatal care
1__postnatal care
1__postoperative care
1__well adult/child exam
1__family planning
1__counseling/advice
1__immunization
1__referred by other phys/agency
1__administrative purpose
1__other (specify)

[25-38]

8. Physician's principal diagnosis this visit

9. Treatment/service ordered or provided this visit (check all that apply)

1__none ordered/provided
1__general history/exam
1__lab procedure/test
1__X-rays
1__injection/immunization
1__office surgical treatment
1__prescription drug
1__non-prescription drug
1__psychotherapy/therapeutic listening
1__medical counseling/advice
1__other (specify)

[39-49]

10. Disposition this visit (check all that apply)

1__no follow-up planned
1__return at specified time
1__return if needed, P.R.N.
1__telephone follow-up planned
1__referred to other physician/agency
1__returned to referring physician
1__admit to hospital
1__other (specify)

[50-57]

C. Data Collection Design

There are a variety of optional techniques suited to the design of a system to collect data appropriate for this study. The relative merits of each are dependent upon the specific objectives of the HSA, and the intentions regarding data utilization. For the most part, it is assumed that the universe of interest is all ambulatory visits occurring in the HSA during a specified time period. (It is recognized that this will include encounters with non-residents and exclude encounters involving residents of the HSA who receive ambulatory care outside of the area.) With this definition of the universe, the essential unit of analysis is the ambulatory encounter. Since the sheer volume of such encounters will necessitate a sample, the objective becomes the selection of a sample of ambulatory encounters that is representative of the universe.

It is expected that most HSAs will have a relatively small number of hospital outpatient departments. As a result, the recommended design for that setting is a survey of all encounters, in all such units in the HSA. Since there is no sampling, the only issues of representation deal with the extent to which data collected during some relatively short specified time period are representative of encounters occurring in some longer time span, and the extent to which the absolute number of encounters permits the desired analysis.

In the case of physicians, certain HSAs may also have an interest in examining ambulatory care at an aggregated level—perhaps comparing different types of practice, physician specialties or other dimensions. In such cases, it will be necessary to construct a sample which is not only representative of all encounters, but which draws encounters from a representative sample of physicians. Thus, a multi-stage sampling procedure will be utilized.

At the most straightforward level this would involve selecting a relatively large random sample of physicians from a complete list, and gathering encounter data from the selected physicians. It is further possible that the HSA will have particular interest in certain types of physicians and wish to stratify the sample in order to insure the selection of an adequate number of the physicians of interest. If this procedure is used, the ambulatory encounters reported by the over sampled physicians will be disproportionately represented in the final sample and a weighting procedure will have to be instituted.

Once having determined the method of selection, a sample of physicians will be drawn and each will be asked to provide ambulatory encounter data. Some sampling issues will remain at this point. It is possible to ask the physicians to sample their patients, and in busy practices this may be a useful means of eliciting cooperation from physicians. In the NAMCS, encounters are sampled at varying rates such that each physician provided no more than ten ambulatory encounter forms per day.[11] Again, the question of weighting will enter, because if physicians have been randomly selected, variable sampling fractions (which result in the same number of encounter forms per day from each physician) will result in an over-representation of encounters which occur in smaller practices.

It should be clear that the issues of sampling ambulatory encounters in physicians' offices will be complex. The sampling decisions will have a dramatic effect on the utility of the data and must, therefore, be made with great care and a clear understanding of the HSA's intentions regarding data use. Reference to appropriate sampling literature is recommended,[12] and discussions with expert consultants may be appropriate in some cases. In the following discussion it is assumed that a multi-stage unstratified sample will be used.

D. Field Procedures

Pretesting

The utilization of a modified version of the NAMCS instrument is in part intended to reduce the need for extensive pretesting. The minor changes suggested probably allow the use of a very informal pretest —

perhaps simple discussions with a relatively small number of area physicians and hospital administrators. If the HSA choses to modify the instrument in order to gather other data of particular local relevance, more extensive pretesting will be required. This should be performed under conditions as similar to actual study procedures as possible.

Procedures to Elicit Study Participation from Hospitals

Efforts to elicit cooperation from the hospitals in the conduct of this study are critical. Since the data are likely to be collected in the outpatient department by hospital personnel, a high level of commitment must be present to insure the validity and reliability of the data. Part of this attempt to maximize cooperation lies in the fact that the instrument is relatively clear and short, thereby minimizing the time loss or disruption of routine that might result from the data collection activities. There are two other general methods whereby the level of cooperation can be enhanced.

First, open and cordial communication with hospital administrators and with the outpatient department personnel must be maintained. Since it is expected that there will be few outpatient departments in the study, it will be possible to avoid such devices as form letters, and to have senior HSA staff make direct contact (by telephone, individual letters and meetings) with hospital personnel.

Second, attempts should be made to insure that as much of the survey leg work as possible is assumed by HSA staff. This will include the delivery and pick-up of survey forms, the provision of any requested help in setting up the actual data collection, etc.

The actual field procedures will commence with a second telephone contact between the study director and the hospital administrators. This contact has the single purpose of making an appointment for a meeting in which the proposed study can be discussed.

Meetings between the study director and each administrator should follow the telephone survey. These will center upon the very pragmatic issues of gaining the cooperation of the hospitals, insuring that the cooperation will not be disruptive or costly to them, and that some identifiable benefits are likely to emerge therefrom. The clarity and brevity of the instrument, as well as the fact that much of the data will be present in the records of previous patients and collected as a matter of course for new patients can be emphasized. Nonetheless, it can be expected that completion of each instrument will require between one to two minutes. In an outpatient department where two hundred visits occur per day, the total time required could be as much as six man-hours. While this is not to say that one person will have to devote this much time to the task, it clearly suggests that the possibility of the HSA paying the salary of a temporary employee to perform the data collection merits discussion. The hospitals may prefer to avoid such a system but the option should be made available. If it is selected, the hospital should be asked to assist in securing a person familiar with routines in the outpatient department who can be trained to reduce the inconvenience that is inherent in data collection of this sort.

On the positive side, it is quite possible that the agency can demonstrate potential benefits to the hospitals that will contribute to their cooperation. Primary among such benefits is data sharing. The study director should be prepared to show each hospital administrator dummy tables and outlines of data analysis that will be provided to the hospitals as a matter of course. He should further be open to discussion of alternative modes of analysis of particular interest to the hospitals. Finally, certain variables pertaining to outpatient department utilization have been noted as having particular utility for the hospital's management purposes.[13] These are:

- appointment status (scheduled or walk-in)
- hour of visit
- new or regular patient

If the hospital is unconcerned with the sharing of the basic data, the possibility of adding one or more of these variables might be discussed. Such additions will increase the time required to collect the data. Additions to the basic instrument should be limited to a very small number of questions, all of which are the "check-off" type.

Procedures to Elicit Study Participation from Physicians

Although certain features of the study per se are related to these issues, the optimal procedure to be utilized in gaining the cooperation of the physicians in gathering and providing the data will depend in part upon the sampling decisions arrived at earlier. The general features include the fact that the instrument is short, no fee data are requested and various professional and specialty associations at the national level are on record as being in agreement that data of this nature are valuable. In addition, the HSA will contact each sampled physician to explain the importance and the mechanics of the survey, provide and maintain assurances of confidentiality and, if appropriate, offer to share the data within the bounds of confidentiality.

If the HSA had opted for a sampling procedure that results in a relatively small number of sampled physicians, these contacts can be made in person by senior study staff. Presumably such persons will be better able to convince the physicians of the need for their cooperation. However, such a sampling procedure will imply a need for each selected physician to provide data regarding a relatively large number of encounters, thus increasing the total amount of work required. If the HSA chooses a sampling procedure which includes a large number of physicians, the number of encounters each must describe will be reduced, but the logistics of contacting the physicians will be such that personal meetings may not be possible. It is obviously easier for the physician to choose not to cooperate if there is no personal contact.

The present study assumes a straightforward multi-stage random sample resulting in approximately 100 participant physicians, each of whom is asked to complete an ambulatory encounter form for each patient seen during a two-week study period. In such a case, attempts to gain cooperation will follow three steps. The first step includes a preliminary mailed contact which describes the planned study and indicates its value and the importance of the sampled physicians' cooperation. The letter can also contain any endorsements of the study that have been provided by local professional associations, and might mention the fact that national associations are in support of the NAMCS.[14] The letter might include a brief description of the study procedures, but should emphasize that these will be explained more fully at a later time. The physician should be informed that an HSA staff member will contact him by telephone to arrange an appointment to discuss the study. In the second step, the noted telephone contact with each physician should be made. This has two objectives: 1) a preliminary assessment of the physician's willingness to cooperate and 2) the setting of an appointment for some convenient time during the week or ten days prior to the actual study period. Unless a physician indicates an unequivocal, absolute refusal to participate, every effort should be made to secure an appointment. In the third step, study staff should be assigned a number of sampled physicians (careful appointment scheduling with cognizance of travel time is required) to be visited. During the visits with the sampled physicians, forms, instructions and return mail envelopes should be provided, and any questions answered.

Data Collection Personnel

Three groups of individuals are involved in the collection of data for this study. HSA staff will be meeting with the sampled physicians and hospital personnel. Since all such meetings must occur within a limited time span, the required number of persons will be determined by the number of physicians and hospitals. With liberal allowances for travel time but careful scheduling, each such person should be able to see three or four physicians per day, hence fifteen to twenty per week. If all meetings are to be held within a one week period, they will require one staff person for every fifteen or twenty physicians in the sample, plus those required for hospitals. These individuals must be carefully selected and have detailed familiarity with the study because it is these individuals who will be responsible for training the persons who will actually perform the data collection, namely the physicians and the office personnel in each setting. The physicians and hospital personnel must be carefully informed as to the nature and objectives of the study and provided clear instructions concerning the completion of the ambulatory encounter forms.

Data Collection Procedures

The first issue in embarking upon the collection of these data is the selection of a time period. As indicated earlier, the period selected must be short enough to aid in efforts to elicit cooperation, but long enough to insure that a sufficiently large number of cases results. In general, a two-week period would seem to be the best compromise. The selection of the specific period is more difficult. Seasonal variations are known to affect the frequency and nature of ambulatory encounters, yet it is unlikely that HSAs will wish to get involved in long term data collection or a complex sampling of different time periods throughout the year. Although it is virtually impossible to determine a "typical" two-week period, certain times are known to be atypical and should be avoided. These include the Thanksgiving to New Years holiday period and summer vacation months.

Since there will, in all likelihood, be considerable variation in the physical and organizational structures of outpatient departments and physicians' offices, no single outline of data collection procedures would have any value. Rather, within the general framework outlined below, the specific system of data collection used in each setting must emerge from discussions with appropriate staff and reflect the most efficient way of doing so in the particular situation. In all cases, several general rules apply.

- A single individual should be designated as the responsible person in charge of data collection.
- The data collection personnel concerned with Part A of the ambulatory encounter form must be carefully instructed as to its completion. This will include verbal instructions and an explanation of the study objectives. At the appropriate time, it will also include the provision of detailed written instructions.
- Part A of the form must be completed before the patient sees the provider.
- The form must then be passed to the provider (probably by attaching it to the medical record) who will complete Part B during, or immediately following, the encounter and return the form to the person in charge of the data collection.
- The providers must be given detailed written instructions as to the completion of Part B. This can probably be best handled by way of a memo routed through the hospital administrator.
- The forms should be collected by the agency frequently enough to insure against storage problems, loss, etc.
- The systems utilized in the several settings should be kept as similar as is practical.

The implementation of the data collection effort should proceed essentially as follows. One week before data collection is to begin, all necessary survey materials should be delivered to the persons established as responsible for the data collection. These materials include appropriate numbers of instruments and written instructions relevant to the completion of each part of the encounter form (examples of these are included in Appendix C). "Appropriate numbers" can be estimated from the data gathered in the preliminary surveys.

During this visit, specific arrangements should be made for the temporary storage of forms — both before and after they have been completed — and a convenient method should be established for the HSA to pick up the completed forms. If current physician office and hospital outpatient department personnel are to be completing Part A of the forms, they can be contacted during this same visit and be provided with the instruction and training noted above. In cases where temporary employees are to be installed for this purpose, they should be contacted sometime during this week for comparable training.

Quality Control

Control over data quality rests primarily with the personnel in the physicians' offices and hospital outpatient departments who actually complete the forms. Thus, their commitment to the study, the clarity of instructions, etc., are the primary methods whereby the HSA staff can influence data quality. In addition, study staff can: 1) contact each setting during the data collection period to answer questions and/or clarify any difficulties; and 2) review returned forms for completeness and internal consistency and resolve problems by telephone contacts.

E. Data Processing and Storage

The volume of data to be analyzed in this study requires the use of computer tabulations, and the data must, therefore, be punched onto cards. The instrument was designed to facilitate pre-coding which will save considerable time and cost by eliminating a coding process.

Three steps are involved in the preparation of these data for analysis. First, each instrument must be checked for completeness and internal consistency with special reference to any marginal notes. The patient ID code should be inserted. Logically, the second step would be the hiring of an appropriately trained person to classify the diagnostic data by inserting the ICDA codes. It is clearly desirable that a nosologist (an individual specifically trained in the systematic classification of disease) be employed for this task, even if the coding must be delayed somewhat. This may, however, present problems and the coding might have to be deferred. This is because nosologists are hard to find and few will be interested in the relatively short-term employment offered by this study. If a person is available, this task will take approximately six weeks (30 person-days). If it is impossible to obtain the services of a trained nosologist, the second option is to employ a senior medical records librarian who has had adequate experience in this type of coding. In any event, the appropriate codes should be inserted in the boxes provided on the instrument. If it is not possible to begin work on the diagnostic coding immediately, it is recommended that the other data be coded and punched so that analysis can begin. The diagnostic codes should, in this case, be punched onto separate cards which can be merged into the data file at a later time. An example codebook is provided in Appendix D of this chapter. Where possible, the diagnostic codes could be inserted on columns 58 to 61 (inclusive) on the first card of each case, prior to the original keypunching. The keypunching should be verified.

It is expected that the data will be quite voluminous. In Central HSA, it would probably reflect some 20,000 cases (encounters) which, depending upon the coding system, would be punched on as many as 60,000 cards. While a file of this size can be stored permanently on cards, its use would be inefficient and unwieldly to say the least. Working files of this size are more appropriately stored on a magnetic tape.

Part 4. Ambulatory Care in Hospital Emergency Departments

Since a significant proportion of all ambulatory encounters occur in hospital emergency departments, the HSA may wish to further expand the ambulatory care data base by adding information descriptive of the ambulatory encounters which take place in this setting. In general, the procedures to gather such data would be similar to those outlined previously with regard to outpatient departments, with one major exception: notwithstanding the definition of ambulatory care provided earlier, it is assumed that HSA's would be interested in non-emergency ambulatory encounters which occur in emergency departments. Thus, emergency room staff will be required to make a professional judgement as to whether or not a given visit is an emergency or a non-emergency ambulatory encounter.

It should be noted that this is precisely the professional judgement that is required in order to complete the emergency room log component of the Study of Ambulance Services which is presented in Chapter 5 of this section. Hence, the obvious opportunity to combine these data collection activities exists. It may be possible for the HSA to develop a data collection procedure which provides for the completion of the emergency room log form for emergency patients, and the ambulatory encounter form for non-emergency patients.

In any case, should the HSA chose to collect data regarding ambulatory care utilization in hospital emergency rooms, the variables, instrument and data processing procedures (codebook, etc.) would be the same as those outlined in this chapter. The field procedures would combine the techniques outlined for the outpatient department study and the emergency room component of the ambulance service study.

II.
DATA ANALYSIS AND USE

A. Physician Productivity and Availability

One of the most important uses of the Physician Survey data is the assessment of physician productivity. For example, one measure of physician productivity, the annual number of physician visits, can be obtained by multiplying the number of patient visits during the physician's most recent complete week of practice by the number of weeks practiced during the most recent year. This measure of productivity can be obtained for each physician specialty. Furthermore, the effects of the physician's age, type of practice and number of auxiliary medical personnel upon the number of annual patient visits provided can be assessed. The specific uses of this measure of physician productivity and its relationship to the various characteristics of physician practices for purposes of resource development (i.e., for purposes of estimating the need for physicians) is described in Chapter 8 of Section III.

Another important use of the Physician Survey data pertains to physician availability and accessibility. For example, the number of full-time equivalent physicians practicing in the HSA or selected subareas therein can be estimated from the number of total hours practiced during each physician's most recent complete week of practice. Furthermore, from the group of FTE physicians, the number who provide direct patient care can be estimated from the number of hours each physician spent in providing such care. Finally, from among the FTE physicians who provide direct patient care, the number who are able to accept new patients (i.e., the number who are currently "accessible" to the residents of the HSA) can be estimated.

The numbers of "accessible" FTE physicians by specialty who provide direct patient care can be related to the populations residing in the various sub-areas of an HSA (e.g., physician to population ratios). Comparisons across sub-areas can then be made for purposes of identifying those areas with the fewest number of accessible physicians relative to the population (see Chapter 8 in Section III).

Further discussions of the uses of the type of data collected in the Physician Survey can be found in the following sources:

- Center for Health Services Research and Development, Measuring Physician Manpower: Contributions to a Comprehensive Health Manpower Strategy. American Medical Association, 1973. (Available from the AMA, 535 N. Dearborn Street, Chicago, Illinois 60610)
- National Health Planning Information Center, Methodological Approaches for Determining Health Manpower Supply and Requirements. Health Planning Methods and Technology Series, Volumes I and II. (Available from NTIS, 5285 Port Royal Road, Springfield, Virginia 22161; $12.50 for a printed copy of both volumes)

B. The Patterns of Ambulatory Care Utilization

One of the specific objectives of this study is to provide HSAs with the necessary data to describe the patterns of utilization of the ambulatory care delivery system in their health service areas. The display and interpretation of the data from this study for the purpose of describing the various factors associated with the provision and utilization of ambulatory care in physicians' offices, hospital outpatient departments and emergency rooms is a necessary first step in the resource development and project review decision-making process of HSAs regarding ambulatory care. This view was shared by most of the participants at the 1972 Conference on Ambulatory Medical Care Data. Those attending the Conference felt that especially in the field of ambulatory medical care where there has been little systematic collection of information, the provision of largely descriptive data is a sound and sufficient objective of ambulatory surveys.[15]

There are several types of data display which would be appropriate for presenting the data from this study for purposes of describing the patterns of ambulatory care utilization in Central HSA. Some examples are presented in Table 1 and Figures 1 and 2. The data presented in Table 1 and Figures 1 and 2 all pertain to patient socio-demographic factors (age, sex and race) and the patterns of utilization associated with these factors.

In Table 1, the annual number, percent and rate of physician office and hospital outpatient visits which are estimated to have occurred in Central HSA are presented for various age, sex and race groups. This type of information is useful for purposes of assessing the differences in the utilization of ambulatory care services among Central HSA's population subgroups. As shown in this table, for example, those under 15 years of age had more physician visits and a higher rate of visits per person than other age groups; the same is true for females as compared to males, and whites as compared to all other race groups. Comparisons of this type can be useful in the identification of those population subgroups in Central HSA who may be medically underserved. For example, the data in Table 1 show that the number of visits per person per year is relatively low for those persons aged 65 years and over. Compared to the most recent national data, persons aged 65 years and over have more physician visits per person than any other age group.[16] This is not the case in Central HSA. In Central HSA the aged population have fewer physician visits per person than any other age group. Another subgroup which appears to be medically underserved is the "all other" race group.

It is not possible with just the data in Table 1, of course, to determine conclusively whether any population subgroup is medically underserved. Data pertaining to the "need" for ambulatory care among

Table 1

Number, Percent and Rate of Physician Office and Hospital Outpatient Visits per Person per Year by Age, Sex and Race: Central HSA

Age/Sex/Race	Annual Number of Visits (000's)	Percent	Visits per Person per Year
Age			
Under 15 years	1,883	25.1	4.0
15-24 years	1,500	20.0	3.7
25-44 years	1,597	21.3	3.5
45-64 years	1,680	22.4	3.9
65 years and over	840	11.2	3.2
Sex			
Male	3,285	43.8	3.1
Female	4,215	56.2	3.9
Race			
White	6,405	85.4	3.8
All other	1,095	14.6	2.5
Total	7,500	100.0	3.5

those persons who, for whatever reason, do not utilize the ambulatory care delivery system would be required. To obtain such data, a family health survey would need to be implemented (see Chapter 15 in this section).

The "annual" numbers of visits in Table 1 are estimated by summing the number of visits for each age, sex and race group which constitute the total two-week sample of ambulatory encounters and multiplying by 26. If weighting factors were used in the sampling process, these would, of course, need to be taken into consideration in the estimation of annual visits. The rate of visits per person per year is estimated by dividing the annual number of visits for each age, sex and race group by the number of persons in each respective group who reside in Central HSA. For purposes of calculating these rates for Central HSA as a whole, it is assumed that the medical service area of Central HSA's ambulatory care delivery system is conterminous with Central HSA's geographic boundaries, and, therefore, adjustments to the denominator of these rates are not necessary.

The data in Table 1 can, of course, be presented for geographic sub-areas within Central HSA, e.g., urban/rural areas, SMSA/non-SMSA areas, counties, etc.* Comparative analyses across these sub-areas can then be made in order to identify those areas that may be medically underserved.

In Figure 1, the combined effects of age and sex upon ambulatory care utilization in Central HSA are presented in the form of a line graph. The varying effects of both age and sex are readily apparent when the information is displayed in this way. In general, the use

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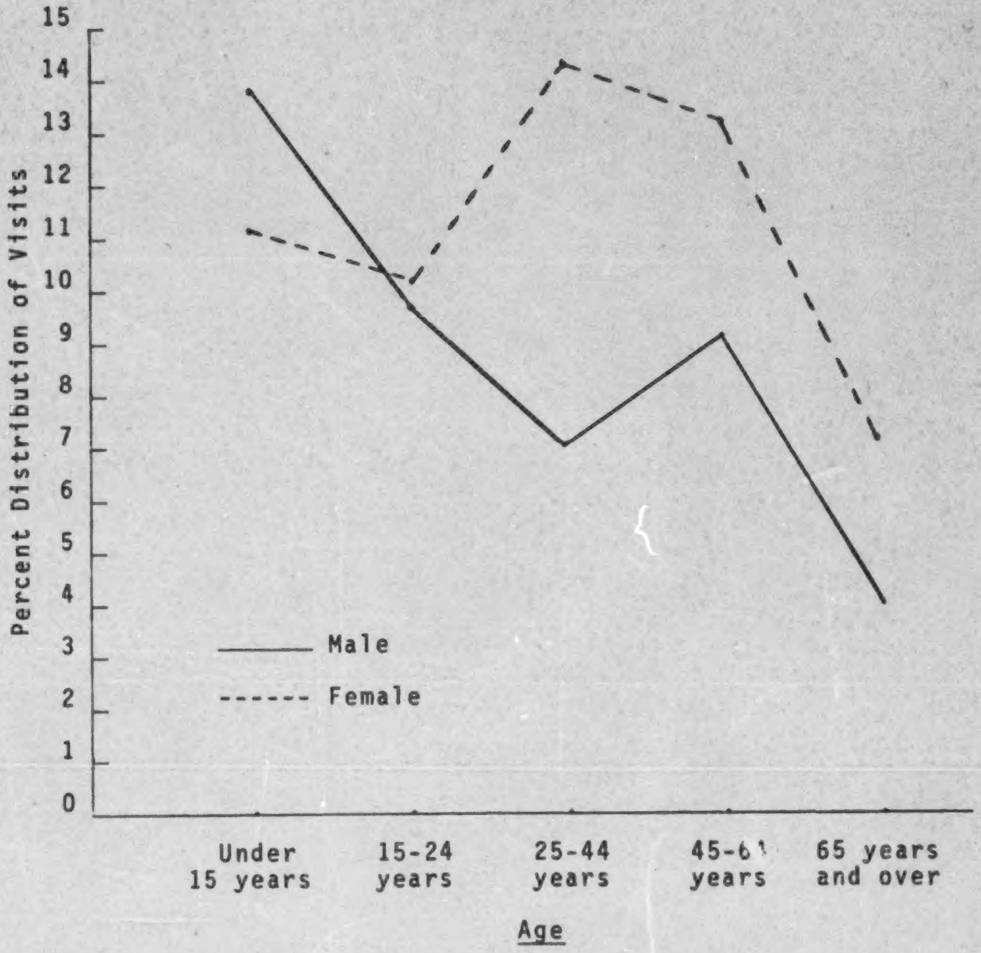
*The denominators in the rates of visits per person per year estimates for geographic sub-areas within Central HSA should be adjusted on the basis of the medical service area patterns of the ambulatory care delivery systems in these sub-areas. The data required to make such adjustments (i.e., patient origin data) are obtained from the patients' addresses on the ambulatory encounter forms. The procedures for making such adjustments are similar to those presented in the Study of the Utilization of Hospital Inpatient Services in Chapter 12 of this section.

Figure 1

Percent Distribution of Physician Office
and Hospital Outpatient Visits by Age and Sex:
Central HSA



of graphs rather than tables (particularly if the results of a study are to be presented to an audience with relatively little data sophistication) more clearly accentuates the differing relationships between selected variables and a particular phenomenon such as the utilization of medical care.

An alternative form of displaying these type of data is the bar graph which is presented in Figure 2. The bar graph is a particularly useful mode for displaying data for comparative purposes. Figure 2, for example, compares the patterns of ambulatory care utilization by age in one hospital outpatient department in Central HSA, i.e., "General Hospital," with all of Central HSA's hospital outpatient departments.

C. Facility Management

The data from this study can be used by physicians and hospital administrators for the management and administration of their office practices and outpatient departments, respectively. The importance of basic information about ambulatory care for purposes of facility management was recognized by the 1972 Conference on Ambulatory Medical Care Records. One of the eight functions for which this Conference felt that better ambulatory care data were needed was "to assist those responsible for the management of office practices, clinics, group practices, hospital-based ambulatory services and other settings where ambulatory medical care is provided, in planning services, in allocating personnel and other resources, and in monitoring costs."[17]

The timely feedback of study data to the physicians and hospital administrators was discussed in the study methodology as an important incentive for eliciting their participation in the study. At the same time, this type of data sharing represents a significant part of the technical assistance that HSAs are expected to provide to

Figure 2

Percent Distribution of Visits to Hospital Outpatient Departments by Age: Central HSA and General Hospital

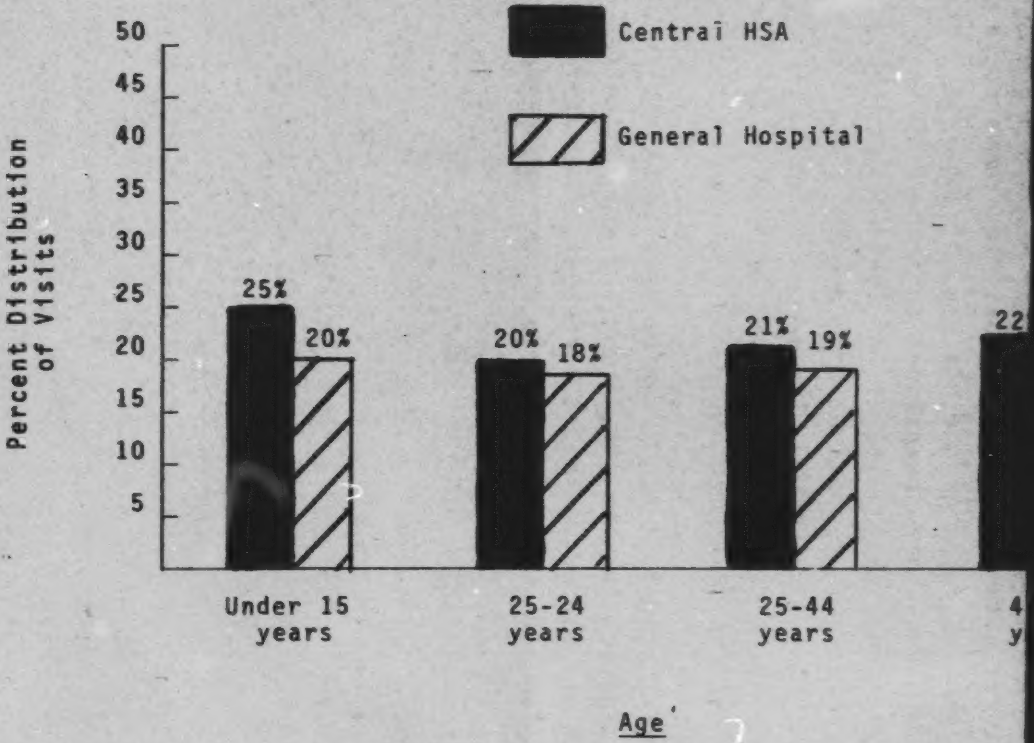
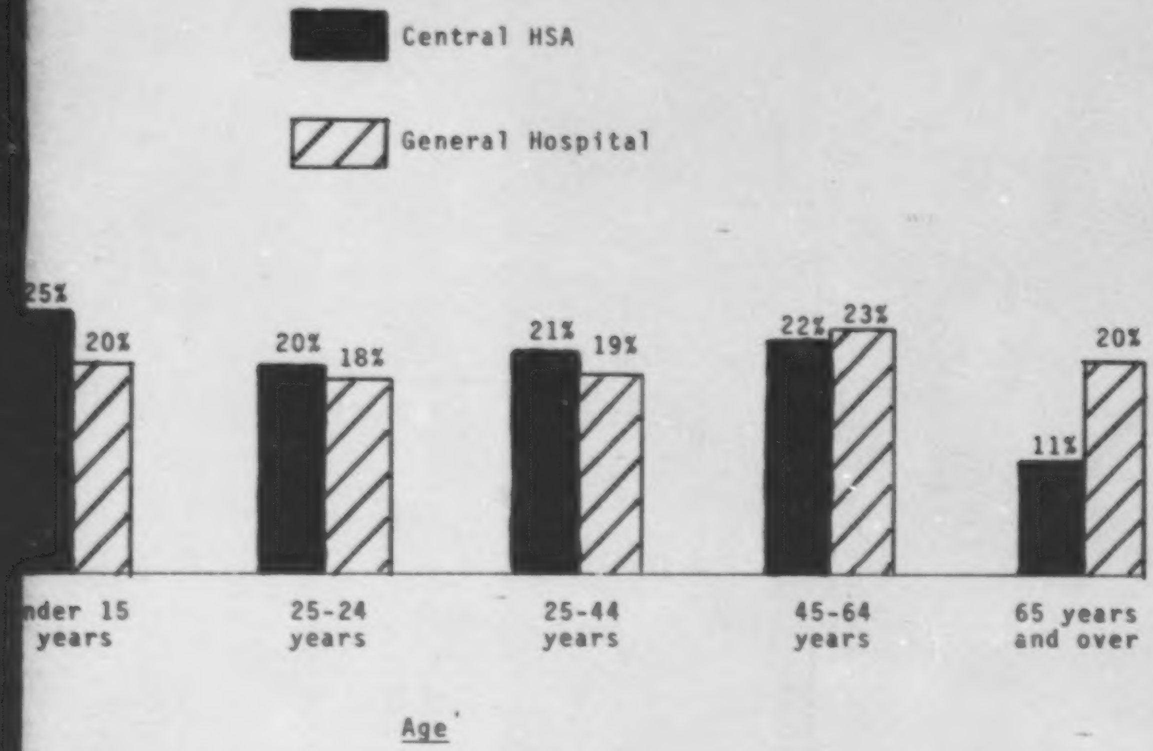


Figure 2

Percent Distribution of Visits to Hospital Outpatient Departments by Age: Central HSA and General Hospital



organizations or individuals involved in health care delivery as stated in P.L. 93-641:

> The agency may provide, in accordance with the priorities established in the AIP [annual implementation plan], technical assistance to individuals and public and private entities for the development of projects and programs which the agency determines are necessary to achieve the health systems described in the HSP [health systems plan], including assistance in meeting the requirements of the agency prescribed under [the procedures and criteria for reviews of proposed health changes]....[18]

By affording the opportunity for HSA staff to work with physicians and hospital officials in interpreting the data, the sharing of study findings will allow mutual input to policy decision-making regarding the provision of ambulatory care in the HSA's health service area. Such processes will allow the HSA to make its priorities known and increase the probability that any decisions made by physicians and hospital administrators regarding specific changes in the services provided in their respective settings will be consistent therewith. As a result, project review may well be made more efficient and can be approached with more equanimity.

Presented in Tables 2 through 7 are several examples of how the data from the ambulatory encounter forms might be displayed for purposes of providing feedback to the individual physicians and hospital administrators for their use in managing their practices and outpatient departments respectively. For purposes of illustration, the data in Tables 2 through 7 only pertain to the patterns of outpatient department utilization during the study period in one individual hospital, "General Hospital." In each of these tables, data could also be presented for the HSA as a whole or any of its geographic sub-areas, and thus, it would be possible to make comparisons between the patterns of utilization in General Hospital's outpatient department (or a particular physician's practice) and those of the other outpatient departments (or physician practices) in Central HSA.

These types of comparisons would be similar to those presented in Figures 2 and 3.

The data presented in Tables 2, 3 and 4 provide useful information concerning the relative numerical importance of the types of general and specific conditions with which the medical staff of General Hospital's outpatient department have to deal. The major reason for visits (Table 2) can be used by the hospital administrator to assess the appropriateness of the mix of medical personnel who staff the outpatient department. For example, the volume of visits for prenatal and postnatal care could have a bearing on the administrator's decision regarding the need for an obstetrician as part of the medical staff. Similar manpower planning information is provided in Tables 3 and 4, where, for example, the volume of mental disorders (Table 3) and, more specifically, neuroses (Table 4) could be a factor in the administrator's decision regarding the need for a psychiatrist, psychologist, psychiatric nurse, psychiatric social worker, etc.

The data presented in Table 5 would provide useful information to the hospital administrator regarding the number and scope of treatments and services that are provided in the outpatient department. Knowing, for example, the volume of outpatient department visits that require X-ray and/or lab services could be a critical factor in determining whether or not the hospital ancillary services department requires an expansion.

Information concerning the disposition of outpatient visits is provided by the data presented in Table 6. Of particular importance to hospital administrators in this table is the number of outpatient visits which result in admission to the hospital's inpatient services.

Finally, in Table 7, information is provided concerning the source of payment. This information could be useful for patient billing and business office management purposes.

Table 2

Number and Percent of Visits to the Outpatient Department by Major Reason: General Hospital

Major Reason for Visit	Number of Visits	Percent*
Acute Problem	678	45.2
Acute Problem, Follow-up	152	10.1
Chronic Problem, Routine	287	19.1
Chronic Problem, Flare-up	51	3.4
Prenatal Care	59	3.9
Postnatal Care	18	1.2
Postoperative Care	74	4.9
Well Adult/Child Exam	91	6.1
Family Planning	38	2.5
Counseling/Advice	30	2.0
Immunization	26	1.7
Referred by Other Phys/Agency	63	4.2
Administrative Purpose	2	0.1
Other	9	0.6

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*The sum of percentages by major reason for visit may be greater than 100.0 percent since one outpatient visit may have more than one major reason.

Table 3*

Number, Percent, and Cumulative Percent of Physician Visits in the Outpatient Department by 19 Major ICDA Classes: General Hospital

Rank	Major ICDA Classes		Nu Vi
1	Supplementary classification: Special conditions and examinations without sickness	Y00-Y13	3
2	VIII. Diseases of the respiratory system	460-519	1
3	Unknown diagnoses (with no code assigned)		1
4	VII. Diseases of the circulatory system	390-458	1
5	XVII. Accidents, poisonings, and violence	N800-N999	1
6	VI. Diseases of the nervous system and sense organs	320-389	7
7	X. Diseases of the genitourinary system	580-629	7
8	XIII. Diseases of the musculoskeletal system and connective tissue	710-738	7
9	XII. Diseases of the skin and subcutaneous tissue	680-709	6
10	V. Mental disorders	290-315	6
11	III. Endocrine, nutritional, and metabolic diseases	240-279	6
12	XVI. Symptoms and ill-defined conditions	780-796	5
13	I. Infective and parasitic diseases	000-136	5
14	IX. Diseases of the digestive system	520-577	5
15	II. Neoplasms	140-239	2
16	IV. Diseases of blood and blood-forming organs	280-289	1
17	XIV. Congenital anomalies	740-759	
18	XI. Complications of pregnancy, childbirth, and the puerperium	630-678	
19	XV. Certain causes of perinatal morbidity and mortality	760-779	
Total			1,50

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*Modeled after Table 9, in National Center for Health Statistics, "National Ambulatory Medi and Methodology: United States—1967-72," Vital and Health Statistics. Series 2, No. 61, April

Table 3*

Number, Percent, and Cumulative Percent of Physician Visits in the Outpatient Department by 19 Major ICDA Classes: General Hospital

Major ICDA Classes		Number of Visits	Percent of Visits	Cumulative Percent
tary classification: Special conditions and examinations out sickness.	Y00-Y13	302	20.1	20.1
eases of the respiratory system	460-519	197	13.1	33.2
iagnoses (with no code assigned).		128	8.5	41.7
ases of the circulatory system.	390-458	123	8.2	49.9
idents, poisonings, and violence.	N800-N999	120	8.0	57.9
ses of the nervous system and sense organs.	320-389	77	5.1	63.0
es of the genitourinary system.	580-629	77	5.1	68.1
eases of the musculoskeletal system and connective tissue.	710-738	74	4.9	73.0
ases of the skin and subcutaneous tissue.	680-709	68	4.5	77.5
disorders.	290-315	63	4.2	81.7
crine, nutritional, and metabolic diseases.	240-279	63	4.2	85.9
toms and ill-defined conditions	780-796	57	3.8	89.7
tive and parasitic diseases	000-136	51	3.4	93.1
ses of the digestive system	520-577	50	3.3	96.4
asms.	140-239	26	1.7	98.1
ses of blood and blood-forming organs	280-289	12	0.8	98.9
enital anomalies.	740-759	9	0.6	99.5
ications of pregnancy, childbirth, and the puerperium	630-678	3	0.2	99.7
in causes of perinatal morbidity and mortality.	760-779	0	0.0	99.7
		1,500	100.0	100.0

after Table 9, in National Center for Health Statistics, "National Ambulatory Medical Care Survey: Background gy: United States—1967-72," Vital and Health Statistics. Series 2, No. 61, April, 1974, p. 29.

Table 4*

Number, Percent and Cumulative Percent of Visits to the Outpatient Department by 15 Most Frequent Principal Diagnoses: General Hospital

Rank	Principal Diagnosis Classified by ICDA Category		Number of Visits	Percent of Visits	Cumulative Percent
1	Medical or special examinations	Y00	91	6.1	6.1
2	Medical and surgical aftercare	Y10	75	5.0	11.1
3	Prenatal care	Y06	59	3.9	15.0
4	Essential benign hypertension	401	53	3.5	18.5
5	Acute respiratory infection	465	50	3.3	21.8
6	Neuroses	300	39	2.6	25.4
7	Observation, without need for further medical care	793	38	2.5	26.9
8	Chronic ischemic heart disease	412	36	2.4	29.3
9	Hay fever	507	29	1.9	31.2
10	Otitis media	381	24	1.6	32.8
11	Acute pharyngitis	462	24	1.6	34.4
12	Obesity	277	24	1.6	36.0
13	Refractive errors	370	21	1.4	37.4
14	Other eczema and dermatitis	692	21	1.4	38.8
15	Diabetes	250	21	1.4	40.2
	All other diagnoses		895	59.7	100.0
	Total		1,500	100.0	100.0

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*Modeled after Table 4, in National Center for Health Statistics, "National Ambulatory Medical Care Survey: May 1973-April 1974." Monthly Vital Statistics Report. Vol. 24, No. 4 Supplement (2), July 14, 1975, p. 4.

Table 5

Number and Percent of Visits to the Outpatient Department by Treatments and Services Ordered or Provided: General Hospital

Treatment/Service Ordered or Provided	Number of Visits	Percent*
None Ordered/Provided	80	5.3
General History/Exam	539	35.9
Lab Procedure/Test	294	19.6
X-Rays	107	7.1
Injection/Immunization	279	18.6
Office Surgical Treatment	134	8.9
Prescription Drug	519	34.6
Non-Prescription Drug	222	14.8
Psychotherapy/Therapeutic Listening	65	4.3
Medical Counseling/Advice	296	19.7
Other	132	8.8

*The sum of percentages by treatments and services ordered or provided may be greater than 100.0 percent, since one outpatient visit may require the provision of more than one treatment or service.

Table 6

Number and Percent of Visits to the Outpatient Department by Disposition of Visit: General Hospital

Disposition of Visit	Number of Visits	Percent*
No Follow-up Planned	341	22.7
Return At Specified Time	618	41.2
Return If Needed	421	28.1
Telephone Follow-up Planned	102	6.8
Referred to Other Phys/Agency	36	2.4
Returned to Referring Physician	14	0.9
Admit to Hospital	60	4.0
Other	14	0.9

*The sum of percentages by disposition of visit may be greater than 100.0 percent since one outpatient visit may have more than one disposition.

Table 7

Number and Percent of Visits to the Outpatient Department by Expected Principal Source of Payment: General Hospital

Expected Principal Source of Payment	Number of Visits	Percent
Government		
Workmen's Compensation	60	4.0
Medicare	135	9.0
Medicaid	210	14.0
CHAMPUS	0	0.0
Other	8	0.5
Insurance Mechanism		
Blue Cross	0	0.0
Blue Shield	45	3.0
Insurance Company	53	3.5
Prepaid Group Practice or Health Plan	97	6.5
Medical Foundation	0	0.0
Self-pay	831	55.4
No Charge	23	1.5
Other	38	2.5
Total	1,500	100.0

Any of the preceding tables pertaining specifically to General Hospital could, of course, be used for presenting aggregate data for all the physician office-based practices and hospital outpatient departments in Central HSA. Furthermore, by aggregating the data in Tables 3 and 4 and by crossing these data by age, sex and race, information on the patterns of disease in the various socio-demographic subgroups who utilized the ambulatory care delivery system would be provided. This information would be helpful in identifying those groups with a disproportionate incidence or prevalence of certain diseases. For certain types of diseases, such as veneral disease, this type of information could be useful in assessing the need for new or expanded educational and preventive health programs, and in identifying the population at risk toward which such programs would be targeted.

D. Outpatient Facility and Manpower Needs

Due to the increasing demand for outpatient department and emergency room services, it is likely that HSAs will be presented with proposals from their area's hospitals for the addition or expansion of outpatient services. In reviewing these proposals, HSAs are required under P.L. 93-641 to include several criteria. One of these is "the need that the population served or to be served by such services has for such services."[19] To apply this criterion will require a methodology for determining the need for outpatient services.

An evaluation of methods for determining the need for outpatient services has recently been made by Abt Associates. This evaluation is contained in a report which was distributed in April, 1975, by BHPRD as part of its technical assistance program to health planning agencies. The report is entitled, A Study For Evaluation of Methods for Determining Outpatient Facility Needs.*

Based upon an evaluation of the methods employed in various health planning agencies and a review of pertinent literature, this report recommends a basic method for determining outpatient facility needs, or, more specifically, the number of new treatment rooms that are needed/demanded. A summary description of this basic method is presented in Appendix E. Numerous assumptions are utilized in the application of this method. It is absolutely essential that those who utilize this method have a proper understanding of these underlying assumptions. A discussion of these assumptions and their implications, as well as some of the limitations and weaknesses regarding the application of this method, is contained in the Abt Associates' study.

One of the steps in this recommended method, Step 5, requires data on the number of outpatient visits per treatment room per hour in use for purposes of translating the number of unmet visits estimated to be needed/demanded in a particular region into the number of needed/demanded treatment rooms (see Appendix E). As described below, the data obtained in this study can be used for this purpose.

The specific formula used in Step 5 of the method in question is as follows:

$$TR = UD \div (DOY \times HOD \times PV)$$

where,

TR = treatment rooms
UD = unmet visit need/demand
DOY = number of days per year each TR is open on the average
HOD = number of hours per day each TR is open on the average
PV = number of visits to each TR per hour open and in use

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*For further information concerning this study and the recommended basic method for determining outpatient facility needs contained therein, contact Ms. Marsha Gold, Abt Associates Inc., 55 Wheeler Street, Cambridge, Massachusetts (617) 492-7100.

Important considerations underlie the use of this formula and the estimate of needed treatment rooms derived from it. As pointed out in the Abt Associates' study, many of the assumptions involved in Step 5 are debatable, and thus, the information produced in Step 5 should be used cautiously.[20]

Based upon certain assumptions, specific values for DOY, HOD, and PV are suggested in the Abt Associates' study to be used in the above formula.[21] They go on to recommend, however, that an agency can refine the assumed values assigned to DOY, HOD, and particularly PV, by collecting data on present outpatient facility operations, and determining from these data what these averages actually are.[22] The data from this study which can be used for this purpose are included in Worksheet A. Referring to Worksheet A:

- Column (1) lists each individual hospital that was included in this study (from Hospital Outpatient Department Survey).
- Column (2) lists the number of visits recorded to have occurred during the two-week study period in each hospital outpatient department (from ambulatory encounter forms).
- Column (3) lists the number of treatment rooms in each hospital outpatient department (from Hospital Outpatient Department Survey).
- Column (4) lists the total number of hours that each outpatient department was in operation during the two-week study period (from Hospital Outpatient Department Survey). For Central HSA, the hours of operation based upon an eight hour per day, five day a week schedule are used.
- Column (5) lists the average number of visits per treatment room per hour of operation during the two-week study period for each hospital outpatient department and for Central HSA as a whole. The figures in column (5) are derived by dividing the figures in column (2) by the figures in column (3) and then dividing the quotient by the figures in column (4).

For purposes of illustrating how the data from this study can be applied to the above formula, the following values will be used:

Worksheet A

Calculation of the average number of visits to each treatment room per hour open and in use by hospital and Central HSA

(1)	(2)	(3)	(4)
Hospital Outpatient Department	Total Number of Visits During the Two-Week Study Period	Number of Treatment Rooms	Total Hours of Operation During the Two-Week Study Period
Hospital A	2,700	12	96[1]
Hospital B	2,150	10	80[2]
Hospital C	1,250	6	88[3]
Hospital D	750	3	80
Hospital E	400	3	80
Hospital F	175	2	80
Hospital G	75	1	40[4]
Central HSA	7,500	37	80

1. 8 hours/weekday plus 8 hours/Saturday
2. 8 hours/weekday
3. 8 hours/weekday plus 4 hours/Saturday
4. 4 hours/weekday

Worksheet A

Calculation of the average number of visits to each treatment room per hour open and in use by hospital and Central HSA

(1)	(2)	(3)	(4)	(5)
ospital ent Department	Total Number of Visits During the Two-Week Study Period	Number of Treatment Rooms	Total Hours of Operation During the Two-Week Study Period	Average Number of Visits/Treatment Room/Hour (2) ÷ (3) ÷ (4)
spital A	2,700	12	96[1]	2.3
spital B	2,150	10	80[2]	2.7
spital C	1,250	6	88[3]	2.4
spital D	750	3	80	3.1
spital E	400	3	80	1.7
spital F	175	2	80	1.1
spital G	75	1	40[4]	1.9
ntral HSA	7,500	37	80	2.5

hours/weekday plus 8 hours/Saturday

hours/weekday

hours/weekday plus 4 hours/Saturday

hours/weekday

1) PV = 2.5 = the average number of visits to each treatment room per hour in Central HSA [column (5) in Worksheet A].

2) HOD = 8 = the average number of hours per day that each outpatient department is open.

3) DOY = 250 = the average number of days per year that each outpatient department is open.

4) UD = 125,000 = the number of additional outpatient department visits needed/demanded in Central HSA (this figure would be derived from implementing Steps 1-4 of the method in question).*

Applying these figures to the above formula, we have the following:

$$TR = UD \div (DOY \times HOD \times PV)$$

$$TR = 125{,}000 \div (250 \times 8 \times 2.5)$$

$$TR = 125{,}000 \div (5{,}000)$$

$$TR = 25$$

Thus, by applying the data obtained from this study to the formula in Step 5 of the method recommended by Abt Associates, 25 new treatment rooms are estimated to be needed in Central HSA to provide the estimated additional outpatient visits that are needed/demanded.**

The method recommended by Abt Associates does not end here, however. As suggested by Abt Associates, "agencies may want to develop the translations for multiple assumptions each time. The result will indicate a range of treatment room needs/demands."[23] Furthermore, other important factors need to be taken into consideration before an HSA can utilize this information in a project review decision concerning the need for additional outpatient facilities. These factors are discussed under Step 6 of the recommended method. The reader is referred to the study report for the discussion of these factors.[24] The purpose here has simply been to provide a specific illustration of how the data obtained from this study can be applied to the Abt Associates' recommended method for determining outpatient facility needs.

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*For an alternative method of estimating the need for physician visits in a given area, see Chapter 8 in Section III.

**This procedure allocates all of the unmet visit need/demand to outpatient departments. All of the unmet visit need/demand, or a proportion thereof, could, instead, be allocated to physicians' office-based practices.

Another aspect of the project review process for which the data from this study can be used pertains to the availability of personnel that would be required to adequately staff the new or expanded hospital outpatient departments which are up for review.[25] Before HSAs can decide if the appropriate personnel are available, they must first have at least two kinds of information. First, they need to know what an appropriate staffing pattern would be to provide the proposed services, and second, they need to know if such personnel are available to fill the required new staffing positions. As described below, the data from this study can be used to provide the first type of information.*

One approach in determining what an appropriate staffing pattern should be for a new or expanded outpatient facility is to use empirically derived norms of current staffing patterns in existing outpatient departments. The appropriateness of using this approach is very much dependent upon the appropriateness of current staffing patterns in existing outpatient facilities. It may be the case, for example, that existing outpatient facilities are overstaffed relative to demand, thus resulting in inefficiency. On the other hand, existing facilities may be understaffed relative to demand, which could result in a poorer quality of care. To the extent that either of these situations exists, the use of current staffing patterns as a standard could result in furthering the problems of inefficiency and/or poor quality of care.

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*Methods for obtaining the second type of information (i.e., the availability of certain manpower types) can be found in A Guide to the Development of Health Resource Inventories, and in Chapter 9 of Section III.

For purposes of illustration, it will be assumed that Central HSA has determined that neither of the above situations currently exists in its area's hospital outpatient departments, and has decided that the above approach would, therefore, be appropriate to use.

Having decided to use this approach, Central HSA will need information concerning the current staffing patterns in the area's outpatient departments. Included in Worksheet B are data from this study which can be used to provide such information. Referring to Worksheet B:

- Column (1) lists each individual hospital that was included in this study.
- Column (2) lists the average number of physician visits per week that occurred in each hospital's outpatient department. These figures are derived by dividing the figures in column (2) of Worksheet A by two.
- Column (3) lists the number of full-time equivalent physicians (i.e., 35 or more hours per week) employed in each outpatient department (from Hospital Outpatient Department Survey).
- Column (4) lists the number of FTE auxiliary medical personnel (i.e., registered physician assistants, RNs, LPNs, nurses' aides, x-ray, lab and medical technicians) employed in each outpatient department (from Hospital Outpatient Department Survey).
- Column (5) lists the average number of visits per week per physician in each outpatient department. These figures are derived by dividing the figures in column (2) by the corresponding figures in column (3).
- Column (6) lists the average number of visits per week per auxiliary medical personnel in each outpatient department. The figures in column (6) are derived by dividing the figures in column (2) by the corresponding figures in column (4)

Again for purposes of illustration, it will be assumed that Central HSA has already determined that a particular hospital's proposal to expand its outpatient department by six additional treatment rooms is needed by the residents of the community. Furthermore, it will be assumed that the current hospital outpatient department staffing

Worksheet B

Calculation of the average number of visits per week
per physician and per auxiliary medical personnel by hospital and

(1)	(2)	(3)	(4)	(5)
Hospital Outpatient Department	Average Number of Visits/Week	Number of FTE Physicians	Number of FTE Auxiliary Medical Personnel	Average Num of Visits Week/Physic (2) ÷ (3
Hospital A	1,350	9.0	21.5	150.0
Hospital B	1,075	6.5	17.0	165.4
Hospital C	625	4.0	11.5	156.3
Hospital D	375	2.0	5.5	187.5
Hospital E	200	2.0	4.0	100.0
Hospital F	88	1.0	2.0	88.0
Hospital G	38	0.5	1.0	76.0
Central HSA	3,750	25.0	62.5	150.0

Worksheet B

Calculation of the average number of visits per week
ysician and per auxiliary medical personnel by hospital and Central HSA

	(2)	(3)	(4)	(5)	(6)
artment	Average Number of Visits/Week	Number of FTE Physicians	Number of FTE Auxiliary Medical Personnel	Average Number of Visits/ Week/Physician	Average Number of Visits/ Week/AMP
				(2) ÷ (3)	(2) ÷ (4)
A	1,350	9.0	21.5	150.0	62.8
B	1,075	6.5	17.0	165.4	63.2
C	625	4.0	11.5	156.3	54.3
D	375	2.0	5.5	187.5	68.2
E	200	2.0	4.0	100.0	50.0
F	88	1.0	2.0	88.0	44.0
G	38	0.5	1.0	76.0	38.0
SA	3,750	25.0	62.5	150.0	60.0

patterns for Central HSA (i.e., one FTE physician per 150 visits per week and one FTE auxiliary medical personnel per 60 visits per week) have been adopted as normative standards.

With these assumptions in mind, the following formula can be used.

$$MP = (TR \times DOW \times HOD \times PV) \div VP$$

where,

MP = the number of FTE medical personnel required to adequately staff the new treatment rooms.

TR = the number of new treatment rooms that are being planned; in this case, six.

DOW = the average number of days per week that each of the new treatment rooms is expected to be open and in use; in this case, five.

HOD = the average number of hours per day that each of the new treatment rooms is expected to be open a and in use; in this case, eight.

PV = the average number of expected visits per new treatment room per hour open and in use; in this case the figure 2.5 derived for Central HSA in column (5) of Worksheet A will be used.

VP = the average number of visits expected to be provided per week per FTE medical personnel; in this case the figures derived for Central HSA in column (5) and (6) of Worksheet B will be used.

Applying the figures obtained in Worksheets A and B to the above formula, we have the following:

$$MP = (TR \times DOW \times HOD \times PV) \div VP$$

Physicians

$$MP = (6 \times 5 \times 8 \times 2.5) \div 150$$

$$MP = 4$$

Auxiliary Medical Personnel

$$MP = (6 \times 5 \times 8 \times 2.5) \div 60$$

$$MP = 10$$

Based upon the above formula and its numerous underlying assumptions, four full-time equivalent physicians and ten auxiliary medical personnel would be required to adequately staff the proposed six new treatment rooms. Caution must be used, of course, in using these figures in the review process. Many other factors would need to be taken into consideration before any final decisions can be made regarding the adequacy of an applicant's staffing estimates as compared to the numbers derived from the above formula. The specific types of physician specialists needed, the appropriateness of using physician assistants, the desired ratio of physicians to auxiliary personnel, the expected patient mix, the specific types of services that are to be provided, etc., are just a few of the additional factors that should be considered.

For a discussion of other uses that could be made of the data from this study than those suggested here, the reader is referred to the papers that were presented during the 1972 Conference on Ambulatory Medical Care Records. These papers can be found in the following source:

> ·Jane H. Murnaghan (edit.), "Ambulatory Care Data, Report of the Conference on Ambulatory Medical Care Records," Medical Care, Vol. 11, no. 2 (Supplement), 1973.

Appendix A

Example Cover Letter for Physician Survey

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Dear Dr. ______________:

As you might know, the Central Health Systems Agency is charged with various responsibilities to study health services in this area. In meeting part of these responsibilities we are in need of certain information from physicians in our area.

Enclosed with this letter you will find a brief questionnaire and a stamped return envelope. Please take a few moments of your time to complete the form and return it to me. Your cooperation is sincerely appreciated. I should note that the information will be treated confidentially and only statistical information describing the system as a whole will be released. No individual physicians will be identified.

Thank you for your cooperation. If you have any questions about this study or any other activities of the Central Health Systems Agency please do not hesitate to call me.

Yours truly,

Appendix B

Example Codebook for Physician Survey Data

Column(s)	Variable	Source	Code
Card 1:			
1-4	Physician ID	Assigned	0001-n
5	Response	Assigned	1=first request 2=second request 3=telephone contact
6	Currently practicing	Survey Header	1=yes 2=no 3=unknown
7	Why not practicing	Survey Header	1=retired 2=other 8=not applied 9=unknown
8-9	Primary specialty	Q 1	use a two digit code blank=unknown
10-11	Year of Birth	Q 2	code last two digits of year blank=unknown
12	Government employee	Q 3	1=no 2=yes 9=unknown
13	Government employee	Q 3	1=USPHS 2=other 8=not applied 9=unknown
14-15	Current practice type	Q 4	11=office, solo 12=office, two-man partnership 13=office, group 21=hospital, intern 22=hospital, resident 23=hospital, medical staff 31=other 99=unknown

Column(s)	Variable	Source	Code
16-17	Number in group	Q 4	code actual number 98=not applicable (all cases not coded 13 on preceding variable) 99=unknown
18	Currently taking new patients	Q 4b	1=yes 2=no 9-unknown
19-20	Registered physician assistants	Q 4c	code actual number blank=unknown
21-22	Other auxiliary medical personnel	Q 4c	code actual number blank=unknown
23-24	Number of weeks practiced	Q 5	coded actual number blank=unknown
25-26	Practice hours per week	Q 6	code actual number blank=unknown
27-28	Direct patient care hours per week	Q 7	code actual number blank=unknown
29-31	Weekly office visits	Q 8	code actual number blank=unknown
32-34	Weekly hospital inpatient visits	Q 8	code actual number blank=unknown
35-37	Weekly hospital outpatient visits	Q 8	code actual number blank=unknown
38-40	Weekly visits, other types	Q 8	code actual number blank=unknown
40-41	County of practice	Header	provide unique code for each county in HSA

Card 2

Columns 1 - 4	Physician ID
Columns 5 - n	Detailed address data

Appendix C

Example Instructions for the Completion of the Ambulatory Encounter Form

Two general rules should be born in mind while completing this form. First, since the data must be accurate if anything of value is to be learned from this study, care should be exercised in completing the form clearly. Second, if you are unsure as to how an item should be completed (this will probably apply only to items 2 and 6) write a description of the problem in the margin or on the back of the form. The numbers and boxes following the questions can be ignored. They will be used only for purposes of coding.

Part A

Item 1. (Date of visit) Complete the date of visit item first, taking care to write legibly. You might wish to complete this item on several forms in advance to save time.

Item 2. (Address) Please print the address information with great care. It must be detailed and accurate. The street address should contain the street number, street name, and the type (Street, Avenue, etc.). For example, an address such as

2999 Main W
Any.
12345

will be almost totally useless. It should be

2999 Main St. West
Anytown
12345

If the address is of a type or format that cannot be written in the boxes provided, please write "Over" across the spaces and print the complete address on the back of the form. If the address is taken from current medical records, its current accuracy should be checked with the patient.

Item 3. (Birth date) Record from current medical record (verify accuracy with the patient) or complete this item after asking the patient.

Items 4 and 5. (Sex and Race) Sex and race should be recorded by observation, with "unknown" being checked in the latter case if categorization is not possible.

Item 6. (Principal source of payment) Check one box indicating the expected source of payment. "Principal" is to be considered the single source which the patient expects to cover the largest proportion of the charges for this visit.

When these items have been completed, be sure that the form is transmitted to the provider so that Part B can be completed during the contact with a provider. If the patient does not have contact with a provider,(perhaps he/she has to leave before the physician is available, or has decided not to see the provider) keep the form separate from those completely filled out.

After Part B has been completed, the form will be returned to you. Place it in the envelope provided, which will in turn be picked up by HSA staff.

Part B

This part of the form should be completed during the encounter between the patient and the provider (physician, nurse or other individual). It should then be returned to the person who completed Part A.

Item 7. (Reason for visit) All major reasons for this visit should be checked. This item is intended to capture the provider's perception of the reason or reasons the visit is occurring.

Item 8. (Principal diagnosis) The principal diagnosis should be written (legibly, please) in the space provided. The boxes can be ignored, as they will be used only for coding purposes. Such diagnosis as "Flu" are too general for accurate coding. A diagnosis like "Influenza with digestive manifestations" is much more useful. "Principal" is defined as the health problem that is most significant in terms of the procedures carried out and the care provided at this encounter.

Item 9. (Treatment/Service) Please check all that apply, specifying where appropriate.

Item 10. (Disposition) Check as many as are applicable.

Appendix D

Example Codebook for Ambulatory Encounter Data

Column(s)	Variable	Source	Code
Card 1:			
1-4	Physician or Hospital ID	Assigned	arbitrary, pre-assigned codes 0001 to n
5-9	Patient ID	Assigned	00001 to n pre-assigned
10-11	Day of visit	Q 1	01-12 designating day 99=data missing
12-13	Month of visit	Q 1	01-31 designating month 99=data missing
14	Year of visit	Q 1	0-9, indicating the year within the decade e.g. 3=1973 6=1976 etc.
15-20	Date of birth	Q 3	Code day and month as above. Code year in a two digit field e.g. 18=1918 36=1936 99=1899 blank=data missing
21	Sex	Q 4	1=male 2=female 9=data missing
22	Race	Q 5	1=white 2=black 3=other 4=unknown 9=data missing

Column(s)	Variable	Source	Code
23-24	Principal source of payment	Q 6	01=Workmen's Compensation 02=Medicare 03=Medicaid 04=CHAMPUS 05=other government payment 06=Blue Cross 07=Blue Shield 08=insurance company 09=prepaid group or health plan 10=medical foundation 11=self pay 12=no charge 13=other 99=data missing
25-38	Reason(s) for visit	Q 7	For each reason, code as follows in successive columns: 0=reason not checked 1=reason checked
39-49	Treatment/ Service	Q 9	For each treatment/ service, code as follows in successive columns: 0=treatment/service not checked 1=treatment/service checked
50-57	Disposition	Q 10	code each category as above
80	Card ID		1=card 1
Card 2:			
1-4	Physician or Hospital ID	Assigned	
5-9	Patient ID	Assigned	
10-n	Address Information	Q 2	
80	Card ID		2=card 2

Column(s)	Variable	Source	Code
Card 3:			
1-4	Physician or Hospital ID		
5-9	Patient ID		
10-13	Diagnosis Code	Q 8	ICDA codes
80	Card ID		3=card 3

Appendix E

Description of Abt Associates' Recommended Basic Method for Determining Outpatient Facility Need*

Step 1: Compute expected ambulatory medical visit need/demand by multiplying the total population in each age and sex group by the yearly visit need/demand expected by that group and adding the results across all population groups. The following equation describes this process:

Need/Demand = $\Sigma(TP_{a,s} \times AV_{a,s})$

TP = Total population in the area

AV = Annual visits expected to be needed/demanded per person

a,s = A particular age and sex grouping of the population

Σ = Sum of the visits expected by each age and sex group in the population across all groups to identify total expected need/demand in a particular area.

Step 2: Compute the number of ambulatory medical visits currently available in the area or to residents in the area by adding all visits currently available from outpatient facilities to those extimated as available from private practice physicians. The equation is as follows:

Supply = $(\Sigma TV_i) + (MD \times YV)$

TV = Total visits provided in a year by an outpatient facility

i = A specific outpatient facility

Σ = Sum of all the visits provided in a year by outpatient facilities in the area.

MD = Number of private practice physicians for the area

YV = Average ambulatory visits per year per private physician

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*Abt Associates, Inc., A Study For Evaluation Of Methods For Determining Outpatient Facility Needs. Cambridge, Massachusetts, December, 1974, pp. xi-xiv.

Step 3: Adjust the existing number of visits (Step 2) to include any future changes in supply which are known or can be estimated. This includes adjusting for loss or gain in private physicians with resulting loss or gain in annual physician visits available; and any known loss or gain in visits provided by outpatient facilities through additions, expansions or closures.

Step 4: Compute unmet visit need/demand through subtracting supply (Step 3) from demand (Step 1).

Step 5: Translate unmet visit need/demand into need/demand for outpatient facilities.

a) Adjust unmet visit demand to exclude that proportion of visits for which it is felt inappropriate to provide outpatient facility care (e.g., those for which planning dictates that private physicians should be recruited).

b) Compute a rough estimation of the number of treatment rooms needed/demanded to provide the unmet visit need/demand. This is done by dividing needed/demanded visits by the expected yearly estimated visits per treatment room based on expected days and hours of operation and patient visits per hour. The equation is as follows:

$TR = UD \div (DOY \times HOD \times PV)$

TR = Treatment rooms

UD = Unmet visit need/demand

DOY = Number of days per year each TR is open on the average

HOD = Number of hours per day each TR is open on the average

PV = Number of visits to each TR per hour open and in use.

Step 6: Review census, health statistics, consumer, provider, utilization pattern and other information. Prepare an analysis and synopsis of the major implications of the information for modification of the figures in Steps 4 and 5, and expansion of these figures to provide greater understanding of area needs/demands and required actions. This step is important for agencies and they should consider the following kinds of factors: population/demographics, health status, cost of care, accessibility of transportation/location, hours of service, service needs, type of facility required, efficiency/capacity of present facilities, substitutions/duplications with other sources of care, and known sources of error in Steps 1-5.

Step 7: Plan and set priorities using information in Steps 1 through 6 and any other priority formulas, equations or criteria of the agency.

Chapter 12

A Study of the Utilization of Hospital Inpatient Services

I

STUDY METHODOLOGY

The purpose of this study is to provide HSAs with information concerning the patterns of hospital utilization in their health service areas. The medical records of persons discharged from study area short-stay general hospitals are the principle source of data in this study.

A. Definition of Concepts

Several concepts require careful definition for the successful design and implementation of this study. These are "hospital," "bed," "bed need," "average length of stay" and "discharge."

> Hospital*: All general and short-term special hospitals located in or serving residents of the HSA, with the exception of military and Veterans Administration hospitals and hospital units of institutions,[1] are to be included in this study. In some HSAs where military and/or VA hospitals are believed to provide a significant amount of acute inpatient care to residents, these types of hospitals can be included. It should be noted that obtaining cooperation from them may be problematic.
>
> A short-term general hospital: 1) has at least six beds and is either state-licensed or exempt from state or local licensing laws;[2] 2) provides diagnostic and treatment services for patients who have a variety of medical conditions, both surgical and nonsurgical,[3] and 3) has an average length of stay for all patients of less than 30 days.[4] A short-term special hospital is one which limits its admissions to patients with specified illnesses or conditions only, and otherwise conforms to the definition of short-term general hospital.

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*See Appendix A for a discussion of definitional differences between the two major organizations which publish national data on hospital inpatient utilization: The American Hospital Association (AHA) and The National Center for Health Statistics (NCHS).

- Bed: The number of beds, cribs, and pediatric bassinets which are presently regularly maintained (set up and staffed for use) in the hospitals which serve HSA residents will be ascertained from extant data for the purpose of projecting future need for beds. Bassinets for newborn infants are not included.[6]

- Bed Need: This concept refers to the number of short-stay hospital beds, excluding newborn bassinets, which are expected to be demanded by the population of the HSA at some specified point in time. A technique for projecting bed need is discussed in detail in the data analysis and use section of this chapter. All bed need projections are based upon the present supply of beds, an item of data not available from this study. The total bed supply by hospital, not broken down by type of bed, is obtainable from the American Hospital Association's annually-published Guide to the Health Care Field.[7] Other data required for projecting bed need are discussed in the data analysis and use section.

- Average Length of Stay: This is the total number of patient days accumulated at the time of discharge by patients discharged during the study period, divided by the number of patients discharged.[8] The number of patient days for each discharged patient is computed by counting all days from (and including) the date of admission to (but not including) the date of discharge. A stay of less than one day (inpatient admission and discharge on the same day) is counted as one day in the summation of total patient days.[9]

- Discharge: This concept refers to the formal release of an inpatient by a hospital, that is, the termination of a period of hospitalization by death or other disposition. For the purposes of this study, any patient* whose hospital stay has been formally terminated during the two-week study period will be included. The unit of analysis, however, is not the patient, but the discharge. Therefore, in theory a patient can be included in the study more than one time (i.e., if the patient were hospitalized and discharged twice or more during the study period). However, since this is a highly unlikely occurrence, it is assumed for this study, as by NCHS,[10] that the terms "discharge" and "patient discharged" are synonymous. A patient who is being transferred from an acute unit to a long-term unit within a hospital is considered to be discharged on that day and must be reported as such.*

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*It should be noted that in this study, newborn discharges are included, whereas NCHS' Hospital Discharge Survey does not collect data on newborn discharges. However, the data on newborns have been excluded from the data analyses presented in this report and, therefore, comparability between this data set and that of the Hospital Discharge Survey, is preserved.

B. Definition of Variables

The selection of variables for inclusion in the study instrument must be the result of a careful process of evaluation. The need for each variable and its availability in the institution's records must both be considered. The purposes of the study, and the unique characteristics of each HSA should also be considered in selecting variables.

In some HSAs all hospitals may already be participants in a hospital discharge abstracting service. In such cases the agency may be able to purchase the data directly from the abstracting firm (with the hospitals' consent) and render the data collection phase of this study unnecessary.

The opposite situation may also exist in some HSAs: hospital records may be very disorganized or incomplete and data collection may therefore be extremely difficult. In general, most variables will be contained in the records of all hospitals; however, the ease with which data may be collected will differ among institutions.

In areas where a majority of discharges are already abstracted on an ongoing basis, the agency should carefully examine the variables collected by the abstracting service. Unless there are substantial reasons for deviation (i.e., incompatibility with NCHS definitions), the categories and classifications used by the abstracting service should be used in the present study. This may allow the agency to collect data only from the hospitals which are not participants in the abstracting service and to purchase the data for the participating hospitals directly from the abstracting service. At a minimum it allows comparisons to be drawn between the study data and data published by the abstracting service.

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*This useful amplification was derived from the Iowa Hospital Association's 1973 patient origin study.

The following variables and their definitions have been selected for their utility and for their general availability in hospital medical records*:

- _hospital identifier_: a number assigned by the HSA to each hospital and entered on the instrument prior to its distribution. Hospital identifier will be included as a variable in every coded data file.

- _medical record number_: a unique number assigned by the hospital to each patient's medical record. This item will be collected for quality control purposes. This number should be one which the hospital regularly uses and which will allow quick retrieval of a record.

- _residence_: the patient's zip code and county of residence. In cases where one or both items are missing, an alternative procedure will be used. The alternative procedure is to copy available address information directly onto the abstract form. HSA staff will then identify county and zip code prior to keypunching of the data.**

- _sex_: male or female.

- _date of birth_: the month, day, and year of the patient's birth.

- _service_: the functional hospital unit to which the patient was assigned following admission. The following categories, at a minimum, are recommended:

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*Except where otherwise indicated, the definitions of variables provided here are compatible with those provided in the NCHS publication: _Uniform Hospital Abstract: Minimum Basic Data Set: A Report of the United States National Committee on Vital and Health Statistics_ (Series 4, Number 14, Rockville, Maryland, August 1974).

**Those HSAs in urban areas which plan to conduct small area geocoded analyses which involve merging hospital utilization files with sociodemographic or economic data from the Census may wish to collect complete street addresses for each discharge (see Chapter 4, Section II for a discussion of the Census Bureau's ADMATCH Program and the uses of geocoded data).

medical/surgical

obstetrical

pediatric

In hospitals without a medical staff organized by clinical service or departments, the data collection person is asked to leave the appropriate columns blank (see Appendix B). HSA study staff will then attempt to infer and code the patient's service assignment from the primary diagnosis and/or principal procedure. In such cases study staff will form a judgment regarding the service to which the patient would have been admitted had this hospital had organized clinical services. This can be done either entirely by hand by study staff or with the assistance of a computer program. For example, all patients under the age of 15 are to be arbitrarily coded as "pediatric." Since this is a straightforward, mechanical process, an algorithm can be written to do this via the computer.

In making such judgments, study staff are to use the following definitions:

> pediatrics: code all persons under age 15 as pediatric. Hospital live births are not to be assigned a service category, unless they remain in the hospital after the mother has been discharged, in which case they are to be classified as "pediatric."
>
> obstetrical: patients admitted for treatment of diseases and conditions of pregnancy from conception to termination of the puerperium (approximately six weeks after delivery). This would include abortions. GYN patients, however, would be assigned to the medical/surgical service.
>
> medical and surgical: all patients not assigned to one of the two preceding categories who were admitted for diseases treated by manual, mechanical, or operative means, whether or not an operative procedure was performed, as well as patients admitted for conditions other than those that are treated by manual or mechanical means.

- admission date: the day, month and year the patient last entered the hospital.

- discharge date: the day (during the study period) on which the patient was discharged from the hospital. Month is predetermined for a two-week study, and even a study which spans two different months will use, say codes from 22 (September) to 3 (October).

principal payment source: the expected mode of payment for the patient's hospital bill, usually recorded at the time of admission. This should be the single source which the patient expects to cover the largest proportion of his hospital bill. Recommended categories for this variable are:

self-pay
Workmen's compensation
Medicare
Medicaid
CHAMPUS
other Government payment
Blue Cross
other private insurance company
prepaid group or health plan
no charge (free, charity, special research, or teaching)
other

principal diagnosis: the condition established after study to be chiefly responsible for occasioning the admission of the patient to the hospital for care. Diagnosis will be operationalized as a 4-digit ICDA-8 code.*

presence of secondary diagnoses: data collection personnel will record on the abstract only the presence or absence of secondary diagnoses and will not code them. Secondary diagnoses are all conditions, other than the principal diagnosis, that exist at the time of admission or develop subsequently which affect the treatment received and/or the length of stay.

principal procedure and date: the principal procedure is either a procedure performed in an operating room or one deemed to be significant (i.e., carrying an operative or anesthetic risk or requiring highly trained personnel or special facilities or equipment). The principal procedure may be distinguished from other significant procedures if it was performed for definitive treatment rather than for diagnostic or exploratory purposes or was necessary to take care of a complication, and/or if it was the procedure most related to the principal diagnosis. The date (month, day, and year) on which the principal procedure was performed will also be recorded since the length of stay both before and after this principal procedure will be of interest in determining length-of-stay norms for the HSA. The principal procedure is to be coded as a 3-digit ICDA-8 code.

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*National Center for Health Statistics, Eighth Revision International Classification of Diseases, Volume 1, Tabular List, Public Health Service Publication No. 1693, Washington, D.C., December 1968. It should be noted that those hospitals which participate in the PAS hospital discharge abstracting system will be accustomed to using another diagnostic coding scheme, H-ICDA. This coding system also requires a 4-digit code. It is recommended that these hospitals be permitted to submit their data in this form. Study staff will have to see that a computer program for converting H-ICDA to ICDA-8 is written. For the principal procedure, either a 3-digit ICDA-8 code or a 3-digit H-ICDA code will be used.

- number of procedures: the total number of procedures performed (up to nine) is to be recorded.
- disposition: the destination specified by the institution or provider at the time the patient left the hospital. Recommended categories are:

  discharged to home (routine discharge)

  left against medical advice

  discharged or transferred to nursing home

  discharged or transferred to another hospital

  discharged or transferred to other type of inpatient health facility

  discharged or transferred to an organized home care service

  died

This information represents a basic core to which agencies may wish to add variables. The selection of additional variables should always be governed by considerations of necessity (is this variable necessary in order to accomplish study purposes) and practicality (will this variable be available from the records of hospitals in the HSA?). Careful thought must be given to the definition of additional variables. Definitions should be distributed to the research staff, and all following activities should apply these definitions consistently in collecting and analyzing the data.

C. Study Instrument

Figure 1 shows the instrument designed to collect study data. Its size and format may depend upon the results of the pretesting process. Since this instrument is intended to serve as the single storage mode prior to the data being keypunched (i.e., it is the coding sheet), it is important to provide adequate space for the coding of desired data. The actual printed form, unlike the example provided in Figure 1, should provide the exact number of spaces required to contain the alphanumeric characters appropriate for that variable, e.g., the "Zip Code" column should accomodate exactly five characters. Column numbers are indicated to facilitate the keypuncher's task.

All data are to be entered by the data collection personnel, with the exception of Hospital Identifier and Case ID, which are the unique numbers assigned by HSA staff prior to keypunching. Both the instrument and the study instructions (Appendix B) are to be delivered to the designated data collection person at the beginning of the study period.

Figure 1

CENTRAL HSA HOSPITAL UTILIZATION STUDY

HOSPITAL IDENTIFIER_____________
(1-4)

MEDICAL RECORD NUMBER	RESIDENCE			SEX	DATE OF BIRTH	SERVICE	ADMISSION DATE
	City or Town (only if county or zip code is unknown)	County Code	Zip Code				
		(5-6)	(7-11)	(12)	(13-20)	(21)	(22-27)

DISCHARGE DATE	PRINCIPAL PAYMENT SOURCE	PRINCIPAL DIAGNOSIS	PRESENCE OF SECONDARY DIAGNOSES	PRINCIPAL PROCEDURE AND DATE		NUMBER OF PROCEDURES	DISPOSITION	CASE ID
								(agency use only)
(28-29)	(30-31)	(32-36)	(37)	(38-40)	(41-46)	(47)	(48)	

D. Data Collection Design

Unit of Analysis

An important step in the design of a study of hospital utilization is the selection of the appropriate unit of analysis. One strategy for collecting utilization data may be to obtain aggregate statistics routinely collected by the hospitals. Aggregate data on occupancy, number of surgical procedures, etc., might be successfully obtained by asking the hospital administrator to fill out a survey form. Few hospitals, however, can provide the level of detail concerning length of stay by diagnosis or procedure which is necessary for the purposes of this study. In order to increase the likelihood that reliable data for all of the HSA are collected, the decision was made to use the individual patient discharge as the unit of analysis.

Sampling Issues

This unit of analysis means that each discharge during the study period is considered a case. Some consideration was given to sampling these cases over an entire year or collecting data from the files of a sample of hospitals. The latter alternative was rejected because the number of hospitals in Central HSA was relatively small. The former alternative was considered to be too disruptive of hospital routine, thus creating problems of cooperation. It was realized that randomly sampling the year's experience might provide greater reliability but such an exercise was felt to be logistically less practical. The decision to abstract all discharges over a specified study period was therefore based on both methodological and practical considerations.

It should be noted that whenever statements about normal or typical patterns are based on data collected for only a short period of time, problems of representativeness may exist. Therefore, care must be exercised in determining both the length of the study (which determines the number of cases) and the timing of the study, i.e., the part of the year from which this "sample" of the whole year's cases is drawn.

Because of the large number of cross-tabulations which are of interest in analyzing the data, and because some conditions which are of interest in establishing patterns of care occur relatively infrequently, a large number of cases (n) is needed. However, since the basic study outlined here does not attempt to compute norms for individual hospitals, it is the overall n and not the number of cases in individual hospitals which is of concern.*

In Central HSA it was determined that a two-week study would generate approximately 12,000 cases, which would be sufficient for the projected analyses. An attempt was made to pick a two-week period which was not atypical of the year's experience. Therefore,a two-week period in early October was chosen for the study. This avoided seasonal fluctuations in occupancy rate known to occur during the Thanksgiving to New Year and summer vacation periods.

Thus, in this HSA, a two-week study allows the development of regional length of stay norms for major diagnostic and surgical categories and also allows some elaboration below the regional level. The two-week data also will be sufficient for the other purposes of this study.

In designing the data collection process the number of institutions and geographic dispersion of these institutions is also an important consideration. While Central HSA contains 40 hospitals, the present study involves the collection of data from 42 hospitals, including two located just across a state boundary. These two out-of-state hospitals were added because a patient origin study conducted by the state hospital association indicated that they served a large number of Central HSA residents. The 42 hospitals thus represent the major resources for inpatient care available to Central HSA residents. Of course, some residents may seek care outside of the Central HSA area, but these residents are assumed not to differ greatly in number from the non-residents who seek services in Central HSA. In other words, after the addition of two hospitals from out-of-state, the study area will be assumed to have an equal number of residents leaving for hospital services and non-residents entering for hospital services. Furthermore, it is assumed that the amount of in-migration and out-migration is small.

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*Should an HSA be concerned with assessing the utilization patterns of individual hospitals they may wish to consider increasing the length of the study period in order to obtain an n sufficient for this purpose.

The 42 study hospitals are not distributed evenly throughout the HSA. The geographic dispersion of these hospitals will influence the amount of travel and time required of the study staff. In general, study coordinators (discussed below) should be assigned fewer hospitals in rural areas.

E. Field Procedures

Pretesting

The utility of this study largely depends on the quality of hospital records and the ability of hospital personnel to abstract information from these records and transfer this information to the study instrument. A thorough pretest is therefore a necessity. This pretest must involve samples of records from several institutions and will probably require more than one stage. The strategy outlined here represents only one method of pretesting an instrument, but can be taken as a description of an adequate pretesting process.

The instrument development process should have produced an instrument which contains the variables necessary for the purposes of the study and which reflects the input of medical records department personnel regarding the feasibility of collecting these variables. The pretest attempts to determine the degree to which this goal has been approximated; that is, the degree to which the instrument will succeed in the field. It is of utmost importance, therefore, that the cases used in the pretest represent a sample of the cases likely to be encountered in conducting the study. Cases must be randomly chosen from the files of hospitals. Furthermore, these hospitals should represent the range of size (and record-keeping sophistication) which will be encountered in the abstracting process. It is suggested that at least three hospitals be included in the pretest and that these hospitals include a small hospital (under 75 beds) a hospital in the 150-300 bed range and a large hospital (over 500 beds). In HSAs where very large or very small hospitals do not exist, a smaller number of participants in the pretest may be feasible.

In the present case it is assumed that no ongoing abstracting system exists in the majority of smaller hospitals in the HSA. Larger hospitals participate in such systems, but no one abstracting firm seems to dominate in this area. Purchase of data is not deemed an efficient alternative for any of the hospitals, but hospitals will be offered the alternative of supplying the data in machine-readable form or in the form of a printout if all data items can be supplied in the correct form on a case-by-case basis. Hospitals with computer capabilities may, therefore, wish to run two pretests: first a pretest of the medical record librarian's ability to abstract discharges on the study instrument; second, an estimate of the time (manpower and computer time) required to provide the data in machine-readable or printout form. These pretests will allow the hospitals to calculate the cost of each method. A description of the first type of pretest is provided below. The second type is informal and mainly requires a computer programmer with a thorough knowledge of the hospital's record-keeping and computer systems. It should be stressed during the second pretest that the breakdowns of the variables must conform exactly to the classifications used in the abstract sheet. If this is not possible the abstracting process must be undertaken.

The pretest of the abstracting process requires about three hours in each of the three hospitals and the following personnel: an HSA staff member familiar with the instrument, a medical record librarian familiar with the organization of the hospital's files, and a consultant (if possible a physician or, as an alternative, an experienced medical record librarian). The agency representative should carefully explain the variable definitions to the hospital's medical record librarian and familiarize that person with the study instrument. A random sample of the last week's discharges should be pulled from the files, or, if this is not possible, all of the last two day's discharges. Larger hospitals will require a lower sampling rate, but a minimum of 30 randomly-selected discharges should be completed by all hospitals. The hospital medical record librarian should complete abstracts for a few of the discharges (3-5) and pass them to the consultant who will also complete them. Any discrepancies in coding, particularly in principal diagnosis and principal procedure, should be discussed. Several more abstracts should be completed and this process should be repeated until sample discharges are exhausted. If discrepancies continue to arise,this process should be repeated with another sample of discharges.

During this process the agency persons must exercise judgment in determining whether variables should be omitted because they are unavailable in the hospital files, or changed because they are incongruent with categories used in the hospital files or have faulty definitions. It is recommended that variables not be omitted if they are missing from the files of only one of the three hospitals.

The medium-size hospital may provide the pretester with fewest problems because this hospital should have a reasonably sophisticated system of records, a mixture of diagnoses and procedures and a capable medical record staff. Pretests in small hospitals where records may be less sophisticated and large hospitals where unusual problems may occur in classifying diagnosis and procedure should be left until the pretesting process has been experienced in the medium size hospital.

If the instrument should prove to be in need of major revisions,this process will require repetition when the changes have been made. While this may seem to be an undue emphasis on pretesting, it should be stressed that the pretest is a necessity if one is to place confidence in this instrument and avoid problems in the field.

Procedures to Elicit Study Participation

Most HSAs will contain administrators who are cooperative and interested in research of this nature, and others who are less favorably disposed toward such a project. In order to facilitate the cooperation of all HSA hospital administrators, representatives of organizations such as hospital associations and hospital councils should be involved in the study design process itself at its earliest stages. The involvement of individual administrators, as well, who are known to favor such a study, can be very useful for assuring cooperation with the agency. It should be kept in mind that the period of time necessary to gain full cooperation may be as long as several months.

From the outset the agency should stress the usefulness of the data, particularly as it will be incorporated into projections of bed need, and the necessity for inclusion of all of the study hospitals in the project. If the support of other agencies, such as the state hospital association, can be gained, this may also enhance the cooperation necessary for the study's successful conduct.

The role of the study coordinators as outlined in the discussion of data collection personnel (below) is central to a successful study. If a particular hospital administrator is very unfavorable toward the study, this person's cooperation may depend very much on contact with the study coordinator. Assigning a respected, persuasive, hospital administrator as study coordinator may be the single greatest factor in gaining each administrator's cooperation.

In conducting the pretest the agency will have developed a reasonably accurate estimate of the time required to complete each abstract. The hospital administrator should be made aware of this time requirement. For small hospitals the manpower requirement will be minimal.

Additional tactics which should be employed in eliciting participation include providing press releases to hospitals wishing to publicize this activity, carefully composing all letters of introduction and, above all, keeping the length of the instrument and the length of the study period at the minimum necessary to provide reliable data.

Data Collection Personnel

Once cooperation is assured, the agency may turn its attention to the logistics of collecting the data. Few agencies possess adequate manpower to assign staff persons to the data collection activity. This research strategy therefore suggests the use of hospital staff persons to complete the abstract forms. The hospital staff members most able to complete this data collection process will be employees of the medical record department.

Unfortunately, the use of hospital personnel produces a situation in which control of the actual data collection process is difficult. Assuring that data are comparable among institutions when the data collection person is different for each institution, requires that the instrument be straightforward, that each variable be carefully defined and that decision rules be provided for all eventualities of data collection. The person collecting the data must receive adequate training in the use of the instrument and in application of the decision rules. The strategy described below attempts to meet each of these requirements.

An initial step is the selection of study coordinators. These study coordinators may be members of the agency staff, hospital administrators, or other persons familiar with the purposes and methods of this study. Each study coordinator will be responsible for a number of hospitals (five to ten, depending on distance between hospitals).

About three weeks prior to the beginning of the data collection phase, letters should be sent to each hospital administrator in the study area. This letter will remind the administrator of the purpose of the study, strongly encourage the hospital's participation, and state that the administrator will soon be contacted by "John Doe," the study coordinator for his area. At this point the advantage of using hospital administrators as study coordinators is obvious. If "John Doe" is perceived as an ally, the hospital's cooperation is much more likely.

During the following week, the project director should hold a training session for the study coordinators. At this meeting the definitions of the variables will be carefully explained, the purposes of the study will be outlined, the decision rules and coding scheme will be presented and several sample abstracts will be completed. The assistance of a medical record librarian from a local hospital, familiar with the organization of hospital files and patient records, is recommended in planning this training session and in developing the example records to be abstracted. Each study coordinator should have an opportunity to complete several sample abstracts.

During the same week, each study coordinator should contact the hospital administrators and ask that their hospitals cooperate in the study. A personal or telephone contact is recommended. The hospital should, in this conversation, be asked to designate a member of their medical record staff as a data collection person. The study coordinator should then arrange a training session with the data collection person from each hospital for which he is responsible. This session will be similar to the one described above, however actual medical records from each hospital's files should be used in the training session. Thus, the instrument may be pretested for each hospital while the data collection person is being trained. If definitional problems occur, or if items are not available in the patient's file, some resolution of these problems should be attempted at this training session.

Data Collection Procedures

The actual data collection should begin within one week. At the end of the first two days of data collection the study coordinator should check the completed abstracts from each hospital and correct any inadequacies. Some retraining may be necessary at this point. After this contact only an occasional telephone check will be needed. At this time also, the study coordinator should make sure that arrangements for returning completed abstracts to the agency (probably by mail) are fully understood. Some phased, e.g., weekly, system will facilitate agency quality control.

Data collection persons should be encouraged to call the agency (collect) if problems arise (e.g., definitional problems, inability to understand instructions). The agency may be able to resolve such problems over the telephone or may find it necessary to ask the study coordinator to visit with the data collection person. While all hospitals will collect data for the same time period, the actual abstracting of the data may be delayed from one to three days at the beginning of the study and extended past the end of the study period because of delays in completing the records and transporting them to the medical records library.

As abstracts are received from the hospital by HSA staff, searches should be made for missing data items. Visual scanning of abstracts should indicate cases where data are missing. Telephone calls to the hospital can then be made to locate the missing data.

Zip code and county code data may also be completed using maps and mailing address information for cases where these data are not contained in the hospital files. Careful attention to completing information for each case at this point in the study will save both time and money during the data analysis phase.

Another procedure suggested at this point in the study is a logical edit of a sample of the abstracts. Randomly selected instruments should be visually checked to make certain that combinations of variables are logical, i.e., that males are not cided as obstetrical patients, etc. This process will be completed for all cases by the computer, but considerable trouble can be saved if hospitals making consistent and regular coding errors can be identified and corrected before the data collection process has been completed.

F. Data Processing and Storage

A study of this type should not be attempted without adequate computer facilities for data processing. A capable computer programmer will be required to perform the logical editing, to check the range of coded response categories and to prepare the data in proper format for analysis. The actual analysis of the data can be performed by the programmer, or, if a software package such as SPSS or BMD is available,* by a member of the agency's staff familiar with these packages.

Prior to keypunching, each case should be assigned a unique "case I.D. number." This will allow computer edits and range checks to identify individual cases containing incorrect (illogical) or miscoded data. This number will be entered in the last five columns of the instrument before it is sent to the keypuncher. Agencies are advised against using the medical record number for this purpose due to the necessity for confidentiality of patient records.

The instrument design allows the data to be keypunched without transfer to coding sheets. Keypunching should include verification of all cases using hardward designed for this purpose. Due to the large number of cases it is suggested that data be stored on tape rather than cards. Whenever tapes are used, it is a good idea to prepare several tapes and store them separately. It is also suggested that the original cards be kept until data analysis has been completed.

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*SPSS, The Statistical Package for the Social Sciences, Second Edition (Nie, et al., McGraw Hill, New York, 1975) and BMD, Biomedical Computer Programs (W. J. Dixon, ed., University of California Press, Berkeley, 1970) are software packages available at many large computer installations. They provide a variety of programs to process and display data.

Processing of the data should include logical edits (procedure vs. sex, age vs. diagnosis, etc.) and range checks (to make certain that cases with sex coded "3" or month coded "15" don't exist). Where errors are found, the original instruments may be checked to determine the source of the error. Telephone calls to the hospital may be required to correct the errors.

Processing of the data will also require the development of an algorithm, i.e., a systematic calculating procedure, which can be used to generate "age at time of admission" from date of birth and admission date. Similar algorithms will also be required to generate length of stay from admission and discharge dates, and to generate pre-operative and post-operative lengths of stay for surgical patients. These algorithms can be written into the computer program during the processing phase or calculated during the analysis phase. Because of the additional time required to run software packages such as SPSS, however, considerable computer time will be saved if these variables are calculated during the data processing phase.

It should be noted that variables may appear in the analysis which do not appear in the instrument. These variables, e.g., hospital size, ownership of hospital, or location of hospital, can be added to the data file during the processing or analysis phase. For example, the addition of hospital size requires that 1) an extant data source such as the American Hospital Association's Guide to the Health Care Field be consulted to determine the bed size of each hospital and 2) that a series of logical statements be written into the computer program (e.g., it is determined from the Guide that hospitals number 4, 11, 37 and 41 have fewer than fifty beds. The computer program, then, should include a statement that "if hospital I.D. equals 4, 11, 37 or 41, bed size equals one." The code one is thereby assigned to hospitals with fewer than fifty beds).

Analysis of the data may begin when the data have been keypunched and all variables requiring a complicated algorithm have been added to the data file by the programmer. Because of the large volume of data involved in a study of this type it will be more convenient to perform the analysis from tape or disc storage than from card decks.

II

DATA ANALYSIS AND USE

A. General Descriptive Uses of Hospital Inpatient Data

P.L. 93-641 requires that HSAs assemble and analyze data which describe the use of their regional health services delivery system's resources by the region's residents, as well as specifically directing attention to describing patterns of use of inpatient services.

Two specific functions of HSAs for which study data describing hospital inpatient use will be valuable are: 1) HSA review of "all institutional health services...respecting the appropriateness in the area of such services,"[11] and 2) HSA review and recommendations to the State Agency respecting the need for proposed new institutional health services.[12]

Project review criteria to be used by HSAs include an assessment of the relationship of /Institutional/ services reviewed to the existing health care system.[13] This study provides data describing a portion of the existing health care system within the HSA's service area, i.e., hospital inpatient services. These services are likely to bear a strong relationship to many of the proposed institutional health services. Therefore, uses of study data for HSA project review are likely to be manifold. It should be noted that data from a study of this duration do not allow precise description of all aspects of the utilization of individual hospitals; however, they do allow regional and subregional patterns to be described.

Several methods of displaying data of this type may be employed. The tables and figures on the next few pages should serve as examples from which agencies may generate tables and figures specific to their circumstances. Variables which may be included in tables describing the area's profile include age of patient, sex of patient, primary diagnosis, principal procedure, type of service to which admitted, size of hospital, location of hospital (SMSA, non-SMSA) and principal source of payment.

Most agencies will wish to compare the profile for their community with national, regional and state data. Published data which may be useful in these comparisons include data from the National Center for Health Statistics, the Commission on Professional and Hospital Activities, and the American Hospital Association.*

Figure 2 represents a gross comparison of surgery rates in Central HSA for the study period with data for the United States in 1973.** This comparison suggests little difference in surgery rates between Central HSA and the nation. However, such large-scale comparisons may be misleading.

Figure 3 indicates that when the age structures of the two populations are controlled, differences in surgery rates exist. Younger persons in Central HSA, particularly those in the under 15 age group, have considerably more surgery per 100,000 persons than is the case for the nation.*** Those over 45, and particularly those 65 and over, are below the national rate in surgery. This is a useful demonstration of the fact that caution should be exercised in interpreting

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*National data are published by the National Center for Health Statistics in the Monthly Vital Statistics series in preliminary form, and later in Vital and Health Statistics, Series 13. Agencies wishing to compare data from their HSA with regional data may wish to consult Length of Stay in PAS Hospitals, United States, (region), 1973 (Ann Arbor, Commission on Professional and Hospital Activities). Data are published annually for individual states in Hospital Statistics (Chicago, American Hospital Association).

**Data for the United States for 1973 were estimated from data published in National Center for Health Statistics, Monthly Vital Statistics Report, Vol. 24, No. 3, 1975.

***Data from the United States are taken from: National Center for Health Statistics, Monthly Vital Statistics Report, Vol. 24, No. 3, May 30, 1975. Care should be exercised in interpreting any comparison of study data with national data since definitions may vary.

Figure 2

Rate of Inpatients Discharged with Surgery from Short-Stay Hospitals per 100,000 Population: United States, 1973; Central HSA, 1976

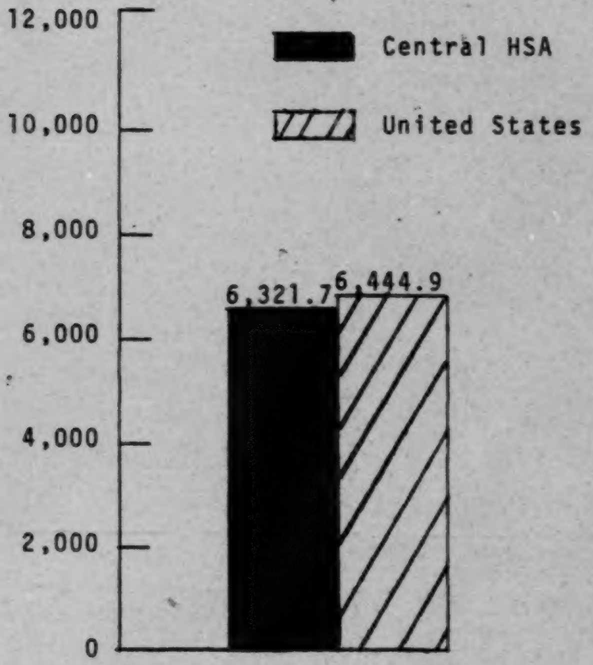


Figure 3

Rate of Inpatients Discharged with Surgery from Short-S
Hospitals per 100,000 Population, by Age:
United States, 1973; Central HSA, 1976

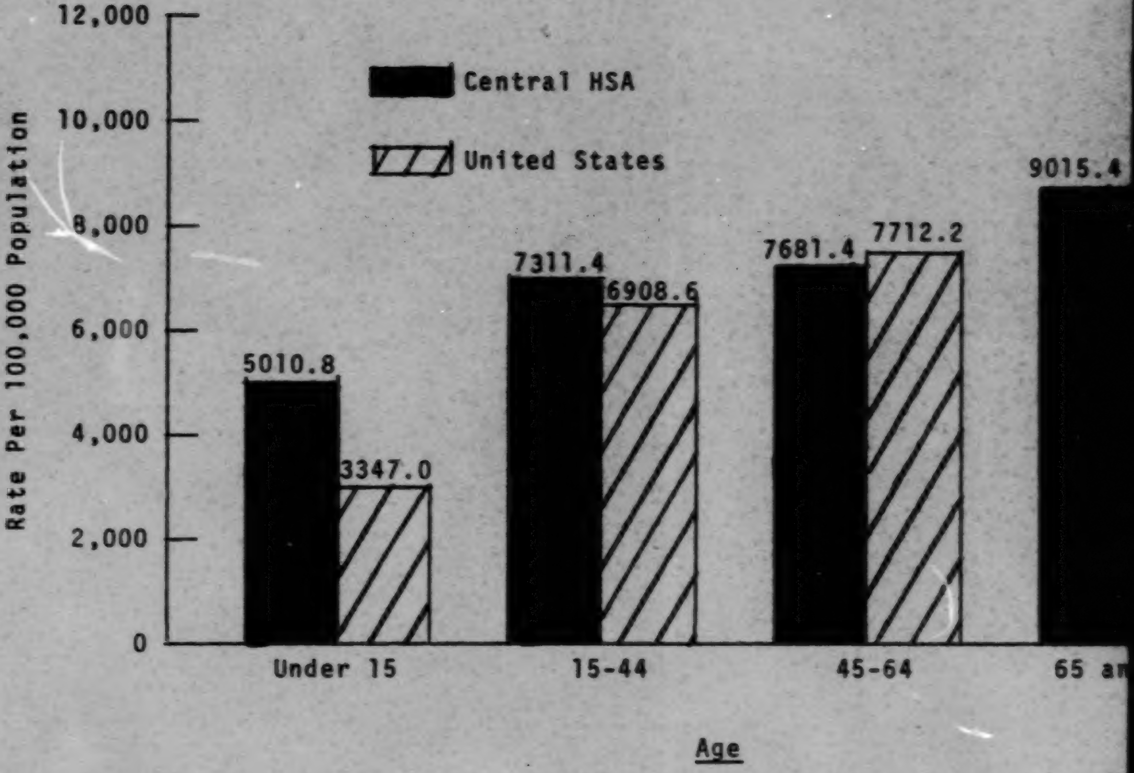
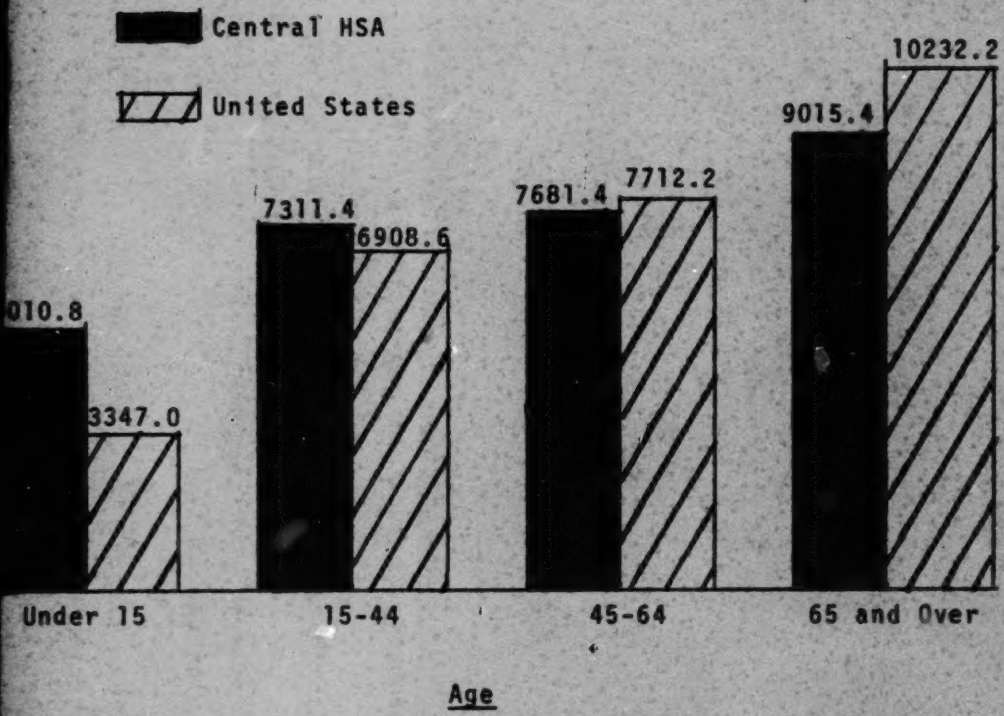


Figure 3

Rate of Inpatients Discharged with Surgery from Short-Stay Hospitals per 100,000 Population, by Age: United States, 1973; Central HSA, 1976



gross comparisons like those in Figure 2. Rates for specific groups of persons can be easily calculated if current population data are available. The rate per 100,000 population by age group for Central HSA is calculated as follows:

1) Determine the number of persons in the age group who were discharged with surgery during the study period. For example 1,245 persons under age 15 were discharged with surgery from hospitals in Central HSA in the two week period.

2) Multiply this number by 52/# of weeks in the study). In this case a two week study was performed so the resulting number is 1,245 x (52/2) = 32,370. This number represents the number of persons each year expected to be discharged with surgery in the under 15 age group.

3) Divide this number by the number of persons under age 15 in Central HSA. 32,370/646,005 = .050108.

4) Multiply this number by 100,000 .050108 x 100,000 = 5,010.8.

Similar calculations for which demographic data are available will probably include sex and residence (SMSA, non-SMSA).

Variables for which population data are unavailable may be expressed as percentages of the total patients discharged. These data may be displayed as histograms or presented as tables similar to the table below (Table 1).

Table 1 shows the percent of all patients discharged with surgery by age for Central HSA. It can be seen that a higher percentage of discharges from large than small hospitals involve at least one surgical procedure in all age categories. The percent of discharges involving surgery is also higher for younger persons than for older persons.

Care should be taken to avoid misinterpreting tables of this type. Whenever data are expressed as a "percent of discharges" or a "rate per 1,000 discharges" they are sensitive to changes in the number of discharges, i.e., the denominator. One might interpret this table

Table 1

Percent of Patients Discharged with Surgery by Hospital Size and Age, Central HSA, 1976

Age	All Sizes	Hospital Size				
		< 100	100-199	200-299	300-399	500 +
Under 15	47%	33%	42%	48%	55%	54%
15 - 44	42%	29%	33%	41%	51%	53%
45 - 64	41%	29%	33%	38%	51%	50%
65 +	30%	20%	22%	24%	29%	30%
All Ages	39%	26%	37%	44%	46%	47%

as indicating that surgery is more common for younger persons in the population, but this is incorrect. Younger persons have a higher percent of discharges with surgery because relatively few of them are admitted for non-surgical reasons. Similarly, persons 65 and over, who have the highest rate of discharges with surgery per 100,000 population (Figure 3) have a lower "percent of discharges with surgery."

It would be preferable, therefore, to utilize a rate per unit population rather than a percent or rate of discharges. However, it is often impossible to calculate such rates due to a lack of information regarding appropriate denominators. In the present table, for example, data on the number of persons in the hospital service area of each "size" group of hospitals would be required to calculate a rate per 100,000 population. As a result, the less preferable method of data display must be used. Careful interpretation of such data is recommended.

A large number of tables and figures useful in describing the utilization of inpatient services in Central HSA may be developed using data from this study, extant data sources and variables generated from extant data such as hospital size or ownership. Some examples of possible figures are: 1) percent of discharges and percent of beds by size of hospital, Central HSA, United States, region, state; 2) percent of patients under 15 years of age discharged with surgery, Central HSA, United States; 3) percent of patients with insurance coverage, Central HSA; 4) number of deaths per 1,000 discharges from short-stay hospitals by age and sex, Central HSA, United States; and 5) percent of patients by disposition, Central HSA.

Tables may include many of the same variables. Some suggestions for tables include: 1) percent of patients discharged with surgery by type of insurance, Central HSA; 2) surgery rate per 100,000 population by county, Central HSA; 3) surgery rate per 100,000 population for operations with large frequencies by operation type* and residence

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*Included in this list would be tonsillectomy, dilation and curretage of uterus, biopsy, hysterectomy, cholecystectomy and others.

(SMSA, non-SMSA), Central HSA, United States, and 4) surgery rate per 100,000 population for operations with large frequencies by operation type, age and sex, Central HSA, United States.

The newest sources of extant data for developing tables comparing Central HSA to the nation, state or region may present data which are two or three years old. Comparative tables must therefore be developed and interpreted carefully. Both the time period represented by the data and the definitions of variables included in the table may be different than those used in the present study.

B. Description of Patient Origin and Patient Destination

County and zip code data from this study are useful in the description of patient origin and patient destination. Patient origin data indicate the zip code and/or county in which the patients discharged from a specified hospital (or group of hospitals) reside. Patient origin data, in other words, are used in answering the question, "Where do the patients who use this hospital come from?" Examination of patient destination provides a different perspective on the same data; it indicates the hospitals from which residents of a specified zip code or county were discharged. Patient destination data, in other words, are used in answering the question "Where do the residents of this county go for hospitalization?" Patient origin/destination data are particularly useful in describing the service area of a hospital, or group of hospitals. Knowledge of service areas is of value in determining appropriate locations for needed services and in reviewing the appropriateness of proposed new or expanded services.

There are a number of methods that can be used in displaying patient origin/destination data.* Presented in Table 2, for example, are origin data for a single hospital ("Community Memorial Hospital")

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*For examples of the display of patient origin/destination data in the form of maps, see Figure 3 and 4, respectively, in Chapter 4 of Section II.

Table 2

The Number of Patients Discharged From Community Memorial Hospital by Service and County of Residence During Two-Week Study Period

County of Residence	Number of Patients Discharged			
	Total	Med/Surg	OB	Ped
County 2	4	-	4	-
County 3	85	42	20	23
County 7	18	8	8	2
County 8	5	3	2	-
County 12	1	1	-	-
Outside HSA	2	-	2	-
Total	115	54	36	25

located in county 3 of Central HSA. The data in this table indicate the number of patients discharged from Community Memorial Hospital by service and county of residence during the two week study period. The counties that are listed in Table 2 represent all of the counties in which patients discharged from Community Memorial Hospital reside. The number of discharged patients who reside outside of Central HSA's service area is also indicated.

The data in Table 2 can be standardized in order to indicate the proportion or percent of patients by county of residence who are discharged from the specific units of service provided in Community Memorial Hospital. For example, 92 percent (23/25) of the pediatric patients discharged from the hospital were residents of county 3, but only 56 percent (20/36) of the obstetrical patients discharged were residents of county 3. What this indicates, in other words, is that the medical service area of Community Memorial Hospital's pediatric unit is essentially contained within the boundaries of county 3, whereas the medical service area of the obstetrical unit extends beyond the boundaries of county 3.

Presented in Table 3 are patient destination data for county 3 in Central HSA. The data in this table indicate the number of county 3 residents discharged by hospital and service during the two week study period. The hospitals that are listed in Table 3 represent all of the hospitals from which county 3 residents were discharged during the two week study period. The number of county 3 residents discharged from hospitals located outside Central HSA's service area are also indicated.

The data in Table 3 indicate that most of the county 3 residents who were discharged from a hospital during the two week study period were discharged from two hospitals-Community Memorial and City Central. Also shown in Table 3 are the variations in the patterns of hospital utilization by type of service. For pediatric services, for example, the residents of county 3 appear to utilize only one hospital resource, Community Memorial.

Table 3

The Number of County 3 Residents Discharged by Hospital and Service During the Two-Week Study Period

Hospital	Number of Patients Discharged			
	Total	Med/Surg	OB	Ped
Community Memorial	85	42	20	23
City General	94	64	30	-
County	15	15	-	-
Northeast	4	-	4	-
Outside HSA	2	2	-	-
Total	200	123	54	23

Data on the sex and age of the patients who utilize Central HSA hospitals could also be included in Tables 2 and 3. It would then be possible, for example, to determine in what numbers and to which hospitals the aged population of a particular sub-area within Central HSA are going for hospitalization. The inclusion of age and sex-specific data in Tables 2 and 3 might not be possible in some HSAs, however, due to the insufficient number of cases obtained in a two week study.

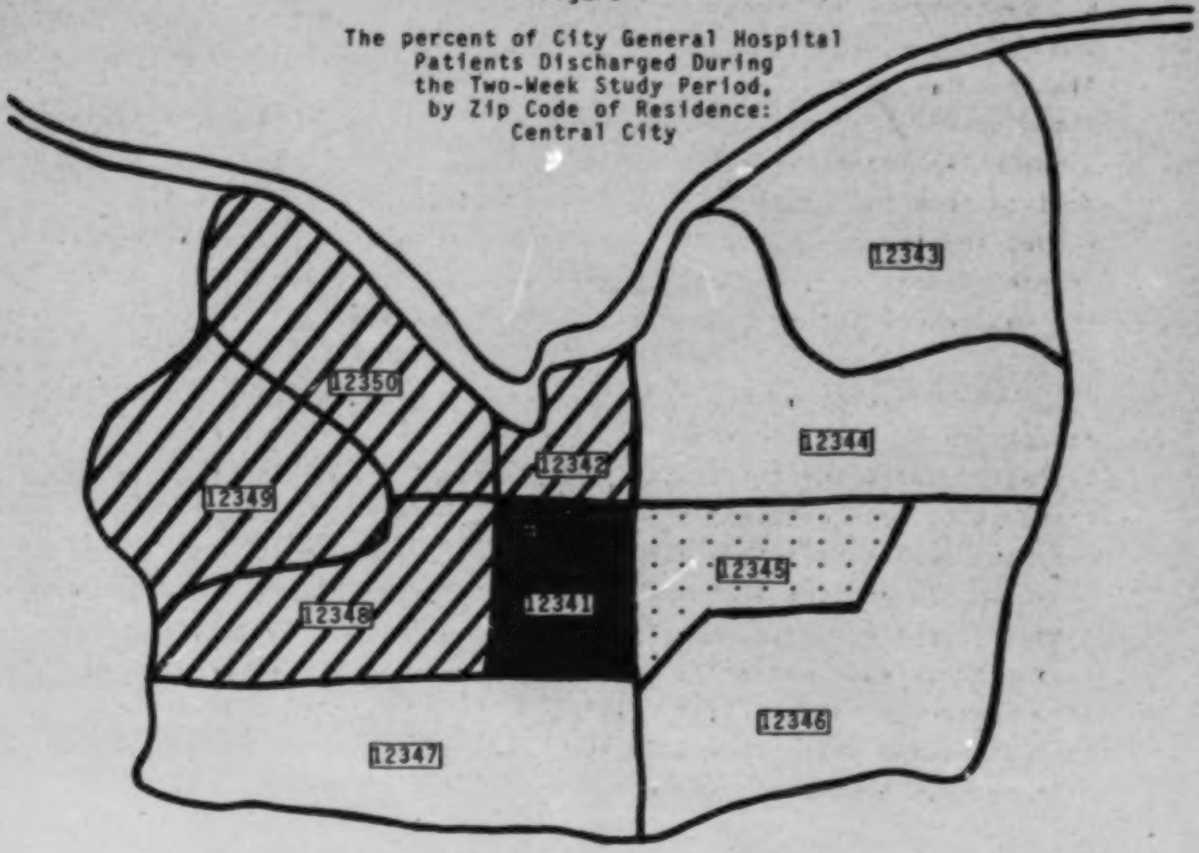
In the preceeding examples, the county was used as the areal unit of aggregation in examining patient origin and destination data. A number of other areal units may be more appropriate in some HSAs. In metropolitan areas, for example, the zip code may be more useful than the county. Figure 4 is an example of one method for displaying patient origin data by zip code in a metropolitan area. Illustrated in Figure 4 is the percent of City General Hospital patients discharged during the two week study period by zip code of residence in Central City. As shown in this figure, the majority of City General's patients originated from the northwest section of Central City and relatively few of its patients came from other parts of Central City.

Some HSAs may find it more useful to use the census tract as the areal unit of analysis within metropolitan areas. Examples of the display of patient origin and destination data using the census tract as the areal unit of analysis are presented in Figures 3 and 4 in Chapter 4 of Section II. The use of the census tract, however, will require that the complete address be obtained for all discharges on the study instrument.

One of the most important uses of patient origin and destination data is in the estimation of the number of persons who reside in hospital service areas. A method for doing this is presented later in this chapter.

Figure 4

The percent of City General Hospital Patients Discharged During the Two-Week Study Period, by Zip Code of Residence: Central City


12343
12350
12344
12342
12349
12345
12341
12348
12346
12347

*location of Northwest Hospital

N

Patients from all other zip code areas constituted 10% of the total patients discharged.

Key

☐ less than 1.0%

⁙ 1.0% to 9.9%

▨ 10.0% to 25%

■ over 25%

C. Description of Length of Stay Patterns

Since variables related to length of stay are also useful for developing a profile of hospital inpatient utilization, the legislative rationale set forth in part A above applies also to these data to be derived from the present study. In addition to their descriptive value, and their utility for project review decisions, data concerning length of stay by age and diagnosis are essential for establishing regional norms for the purpose of PSRO functions.

PSROs are directed by P.L. 92-603 to apply norms of care to institutionalized persons whose health care costs are reimbursable under Titles V, XVIII and XIX of the Social Security Act. Such norms are to be based upon patterns of medical practice in the PSRO region, such as "typical lengths-of-stay...by age and diagnosis."[14] Since PSRO and HSA regions are, to the maximum extent feasible, to be coterminous,[15] there exists the possibility that these two agencies will cooperate to some extent in producing data on hospital lengths of stay by age and diagnosis.* Tables 4, 5 and 6 which follow are examples of tables which relate to the needs of either or both types of agencies for length of stay data.

Length of stay may be computed for each discharge represented in this study from the date of admission and discharge coded on the discharged patient's data file. Other variables which may be computed for surgical patients are length of stay prior to surgery and length of stay subsequent to surgery.

Because of the large number of diagnosis and surgical procedure codes found in the ICDA-8 coding scheme, it will not be possible to generate detailed length of stay tables for individual hospitals from a two-week study. Agencies wishing to develop norms for detailed diagnostic categories and to compare individual hospitals to these norms will require a much larger time period, perhaps a full year. A study of this length is a major undertaking and produces a very large data file. In Central HSA approximately 11 million columns of data would be produced by a one-year application of the instrument outlined in this study. The increased reliability of the data produced from a study of longer duration must naturally be weighed against the increased cost of a longer study. In Central HSA a two-week study represents an absolute minimum. A study of four one-week periods randonly sampled from the year would, of course, produce more reliable data; a census of all discharges for a year would produce maximum reliability for that year.

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*The precise nature of such cooperation will vary from HSA to HSA.

Table 4 shows an age and sex breakdown of length of stay for Central HSA and a comparison of these data with national data for 1973 published by NCHS.[16] The right-hand column provides one overall breakdown of length of stay. This column indicates that Central HSA differs substantially from the nation in average length of stay for neoplasms and diseases of the circulatory system. A different type of breakdown is provided in the vertical columns. These show that length of stay by sex is fairly similar in Central HSA to the nation as a whole. However, the age breakdown indicates that pediatric patients in Central HSA (those under age 15) experience longer lengths of stay for most conditions than is the case for the nation. This information may be valuable to the planner and may be incorporated into the bed need projection formula presented in this document; however, caution should be exercised in interpreting these differences. Because of large standard errors which may exist when the number of cases is small, the observed differences may be meaningless. Most extant data sources publish tables of standard errors which allow the magnitude of the standard error of the average length of stay for specific diagnoses to be estimated.[17] The present study will also have large standard errors because the number of cases is relatively small and because the sample of the year's experience is small.* For this reason, diagnosis-specific lengths of stay for individual

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*In calculating standard errors it will be necessary to assume that the study period represents a 14/365 random sample of the year's discharges. Since the sample is not random it is suggested that an alpha level less than or equal to .01 be chosen in calculating confidence intervals (see Chapter 2 in Section I).

Table 4

Average Length of Stay by Age and Sex for Selected Diagnoses; United States, 1973; Central HSA (CHSA), 1976

Diagnosis	Age								Sex			
	< 15		15-44		45-64		65+		Male		Female	
	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA
All conditions	4.5	6.3	5.7	5.8	9.1	9.3	12.1	12.2	8.3	8.4	7.4	7.6
Infectious and Parasitic Diseases	4.7	4.9	6.5	6.4	7.4	7.3	9.5	9.4	6.5	6.4	6.2	6.1
Neoplasms	9.0	10.1	7.0	9.2	11.1	13.4	14.6	15.7	12.4	13.2	10.4	11.1
Endocrine Nutritional and Metabolic Diseases	7.0	*	7.4	7.3	10.0	9.9	13.0	*	10.2	10.1	9.9	9.8
Diseases of the Blood and Blood Forming Organs	4.9	*	6.3	6.3	9.5	9.1	11.8	10.8	7.1	6.9	8.8	8.6
Diseases of the Circulatory System	10.8	12.4	8.3	8.5	10.7	9.2	12.8	11.0	11.0	10.0	11.8	11.1
Respiratory Diseases	3.6	5.9	4.8	5.0	8.1	7.9	10.9	10.8	6.1	6.0	5.8	5.8
Diseases of the Digestive System	4.2	8.3	6.4	6.4	8.6	8.7	10.7	10.5	7.5	7.5	8.2	8.1
Diseases of the Genitourinary System	3.9	5.0	5.2	5.3	6.3	6.4	10.4	10.3	7.3	7.4	5.8	5.2
Accidental Poisoning and Violence	5.1	5.2	6.5	6.5	9.4	9.3	14.1	15.0	7.2	7.3	6.7	6.8

* insufficient number of cases

Table 4

Average Length of Stay by Age and Sex for Selected Diagnoses; United States, 1973; Central HSA (CHSA), 1976

	Age								Sex				All Discharges	
	< 15		15-44		45-64		65+		Male		Female			
	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA	U.S.	CHSA
	4.5	6.3	5.7	5.8	9.1	9.3	12.1	12.2	8.3	8.4	7.4	7.6	7.8	7.9
ses	4.7	4.9	6.5	6.4	7.4	7.3	9.5	9.4	6.5	6.4	6.2	6.1	6.3	6.2
	9.0	10.1	7.0	9.2	11.1	13.4	14.6	15.7	12.4	13.2	10.4	11.1	11.1	13.1
	7.0	*	7.4	7.3	10.0	9.9	13.0	*	10.2	10.1	9.9	9.8	10.0	9.9
	4.9	*	6.3	6.3	9.5	9.1	11.8	10.8	7.1	6.9	8.8	8.6	8.1	7.9
tem	10.8	12.4	8.3	8.5	10.7	9.2	12.8	11.0	11.0	10.0	11.8	11.1	11.4	10.5
	3.6	5.9	4.8	5.0	8.1	7.9	10.9	10.8	6.1	6.0	5.6	5.8	6.0	5.9
m	4.2	8.3	6.4	6.4	8.6	8.7	10.7	10.5	7.5	7.5	8.2	8.1	7.9	7.9
	3.9	5.0	5.2	5.3	6.3	6.4	10.4	10.3	7.3	7.4	5.8	5.2	6.3	6.2
	5.1	5.2	6.5	6.5	9.4	9.3	14.1	15.0	7.2	7.3	6.7	6.8	8.2	8.3

nsufficient number of cases

hospitals should not be calculated from a two-week study. Length of stay norms calculated for regions within the HSA, and for the HSA itself should be carefully used, keeping in mind the size of the standard errors.

While individual hospital length of stay norms should not be calculated for specific diagnoses from a two-week study, some information is available which may be useful in further evaluating the utilization of services in individual hospitals. Tables for individual hospitals may be calculated providing lengths of stay by service category (medical-surgical, OB or pediatric). For a few large hospitals, tables may be calculated providing data on length of stay by major diagnostic categories, e.g., infective and parasitic diseases (ICDA 000-136) neoplasms (ICDA 140-239) etc. These lengths of stay may then be compared with norms developed for similar categories for Central HSA as a whole. Tables 5 and 6 represent some uses of this length of stay data in examining the patterns of care in individual hospitals.

Table 5 presents a comparison of data from the entire HSA with data from one hospital. General Hospital, located in SMSA-C, is one of two hospitals in that SMSA. Expansion of General Hospital's medical surgical bed supply is being considered because the occupancy rate for these beds is currently about 95%. Table 5 provides information that is of interest to both the hospital and the planner in understanding the reason for the high occupancy rates. Length of stay for non-surgical cases is only marginally higher than that for Central HSA, but length of stay for surgical cases is substantially higher at General Hospital. Further information on this relationship is provided in Table 6. The longer length of stay for General Hospital appears to be the result of time spent in the hospital prior to surgery rather than longer recovery times. It should be noted that data for SMSA-C were not included in Table 6 because they appear to be skewed by the length of stay in General Hospital. This occurs as the result of the fact that only two hospitals exist ~~in~~ SMSA-C, thus the

Table 5

Average Lengths of Stay for Surgical and Nonsurgical Cases, Central HSA, SMSA-C, General Hospital, 1976

	Average Length of Stay (days)		
	Central HSA	SMSA-C	General Hospital
Nonsurgical	7.7	7.8	7.9
Surgical	7.9	8.7	9.4
Total	7.8	8.2	8.5

Table 6

Average Lengths of Stay for Surgical Patients Before and After Surgery, Central HSA, General Hospital, 1976

	Average Length of Stay (days)	
	Central HSA	General Hospital
Before	2.7	4.1
After	5.2	5.3
Total Stay	7.9	9.4
	(n=4,728)	(n=114)

length of stay at General Hospital has a large effect upon the average length of stay for the entire HSA.

In further examining this situation, a variety of information from the present study may be used. For example, General Hospital's patients may differ in residence, type of insurance or diagnosis from the "typical" surgical patient in Central HSA. It is also possible that the study period may have produced an unrepresentative sample of General Hospital's patients. Comparison of study data with data from the hospital's administrative records should help to eliminate this alternative explanation.

Cases representing healthy newborn infants were excluded from the profile and length of stay tables for Central HSA. Care should be exercised in determining whether newborns are included or excluded from extant data sources used for comparisons. Since most extant data sources will exclude healthy newborns from analyses,these cases should be excluded from most comparative tables. In other situations, the data regarding newborns might prove useful in assessing the need for prenatal care in certain counties, or in evaluating plans to change the number of bassinets in a community.

D. Estimation of Hospital Service Area Population

As noted elsewhere in this Handbook (Chapter 7 in Section III), a serious limitation in many of the rates and ratios used in measuring the availability of hospitals and their utilization is the lack of correspondence between the geographic boundaries that are used for purposes of deriving the population figures in the denominators of such rates and ratios, and the actual service areas of hospitals. In the absence of patient origin and destination data, it has often been assumed that the boundaries of hospital service areas coincided with the boundaries of the counties in which the hospitals were located. The populations of these counties were then used in the denominators of bed to population ratios, admission rates, etc. With the use of patient origin and destination data, the populations of the hospital service areas, and thus the denominators of these rates and ratios, can be more accurately estimated. The accuracy of these rates and ratios will be a particularly important factor in the estimation of the need for hospital beds in the HSA's health service area.

Presented in Worksheet A is an example of one method of estimating hospital service area populations. The example presented in Worksheet A refers to the estimation of the hospital service area population of the two hospitals that are located in SMSA-C of Central HSA.

In column (1) of Worksheet A are listed all of the counties in which the patients discharged during the study period from the two SMSA-C hospitals reside. In column (2) is the number of residents in each county who were discharged from the two SMSA-C hospitals. In column (3) is the total number of residents in each county who were discharged from hospitals during the study period. In column (4) is the proportion of total residents in each county discharged from a hospital who were discharged from the two SMSA-C hospitals. The figures in column (4) are derived by dividing the figures in column (2) by the corresponding figures in column (3). The most recent population estimates for each county are listed in column (5). And finally, in column (6) the components by county of the estimated service area population of SMSA-C hospitals are listed. The figures in column (6) are derived by multiplying the figures in column (4) by the corresponding figures in column (5).

The total service area population of SMSA-C hospitals is then estimated by adding the figures in column (6). Thus, according to Worksheet A, the service area population of SMSA-C hospitals is estimated to be 188,921. The method presented in Worksheet A can also be used in estimated age/sex-specific service area population simply by using the desired age/sex data in columns (2), (3) and (5) of Worksheet A. The service area populations derived from Worksheet A can be used in estimating the need for hospital beds in SMSA-C. In the

Worksheet A

Estimation of Hospital Service Area: SMSA-C Hospitals

(1)	(2)	(3)	(4)	(5)	
County	Number of Residents Who Utilized SMSA-C Hospitals	Total Number of Residents Who Utilized a Hospital	Proportion Who Utilized SMSA-C Hospitals	Estimated Population	E v la
			(2) ÷ (3)		
1	14	57	.246	21,900	
4	51	58	.879	11,200	
5	638	638	1.000	112,200	
6	78	163	.478	38,890	
9	97	97	1.000	8,500	
10	24	24	1.000	34,400	

Total:

Worksheet A

Estimation of Hospital Service Area: SMSA-C Hospitals

(2)	(3)	(4)	(5)	(6)
umber of idents Who ized SMSA-C ospitals	Total Number of Residents Who Utilized a Hospital	Proportion Who Utilized SMSA-C Hospitals	Estimated Population	Estimated Service Area Population of SMSA-C Hospitals
		(2) ÷ (3)		(4) x (5)
14	57	.246	21,900	5,387
51	58	.879	11,200	9,845
638	638	1.000	112,200	112,200
78	163	.478	38,890	18,589
97	97	1.000	8,500	8,500
24	24	1.000	34,400	34,400
			Total:	188,921

following discussion on estimating hospital bed need, the use of these service area adjusted populations will be illustrated.

E. Estimation of Future Bed Need

In addition to serving some of the same purposes previously described, estimation of the need for beds in each health service area and within the state will satisfy another requirement specified in P.L. 93-641. Section 1603 of this law deals with the development of a state medical facilities plan. Such a plan must exist before projects eligible for funding under Title XVI of P.L. 93-641 can be approved. These are projects for the modernization of medical facilities, the construction of new out-patient medical facilities, the construction of new inpatient medical facilities in areas which have experienced recent rapid population growth and the conversion of existing medical facilities for the provision of new health services.[18] The medical facilities plan is to be developed by the State Agency. It is to be based, among other things, upon the plans of health systems agencies within the state. The first-mentioned purpose of this plan is to set forth

> the number and type of medical facility beds and medical facilities needed to provide adequate inpatient care to people residing in the State, and a plan for the distribution of such beds and facilities in health service areas throughout the State.[19]

In other words, the State Agency or the HSA must estimate future hospital bed need by type of bed for each health service area.

Data from this study may be used to project bed need. A formula which expands the traditional formula used for bed need projection, and thereby provides a more refined technique for estimating the number of beds needed in an HSA or a region within an HSA is presented in the following pages.* Other methods for projecting hospital bed need are discussed in Chapter 7 of Section III.

One component of the Hill-Burton bed need formula (the formula often used in the past by health planners) is the *use rate*. This statistic indicates the rate at which services are used per 1,000 persons per year. It can be broken down into two components, population expressed in thousands and the number of *patient days* per year. Patient days are divided by the population figure to produce the use rate. In the formula presented in this document the number of patient days is broken down into two components. It represents the product of two variables, *discharge rate* and *average length of stay*. Each of these variables may be estimated for Central HSA using information from a variety of sources. For example, national estimates, data from the present study or other information. In its simplest form and regardless of the source of information, the proposed estimate of bed need is calculated according to the formula:

$$\text{bed need} = [(D \times L \times P) \div 365] \div R$$

where,

D = annual discharge rate per 1,000 population

L = average length of stay

P = population (in 1,000s)

R = occupancy rate

The "occupancy rate" utilized will depend upon the needs and objectives of the agency. It might be some arbitrarily defined

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*A variety of formulas may be used in projecting bed need. A review of several of these formulas is contained in "Literature Review--Suggested Formulas: Bed to Population Ratios," *Reference Manual for Project Review: Standards and Criteria* (New Orleans, Tulane University School of Public Health and Tropical Medicine), January 7, 1974; and Mara Minerva Melum, *Assessing the Need for Hospital Beds: A Review of Current Criteria*, InterStudy: Minneapolis, Minnesota, December 1975.

"appropriate" rate of occupancy, it might be an estimate of the current situation in the HSA, or it might be a national estimate.

For Central HSA, application of this formula to data from the present study and from extant data sources results in the following estimate of need. Assuming that we find that D = 136.98, L = 7.9, P = 2,133 and the occupancy rate is .85, then bed need equals 7,440 beds.

This sample application of the formula represents a gross oversimplification of the situation, but does demonstrate the way in which the formula operates. In Worksheet B on the following pages, a more specific application of this formula is presented, namely the estimation of bed need for SMSA-C in Central HSA.

The calculation of the number in each column of Worksheet B is as follows. Column (1) represents an estimate of the number of persons in each relevant age-sex category who reside in the service areas of the SMSA-C hospitals. A method for deriving these figures was presented earlier in this chapter.

The current number of discharges displayed in column (2) represents all discharges from SMSA-C hospitals in a year's time. These figures represent an estimate based on the number of discharges in the two-week study period (63 discharges in two weeks x 26 = 1,638 males under age 15 discharged).

Column (3) displays the current discharge rate, which is calculated by dividing column (2) by column (1). For males under 15 the result is 1,638/19.664 = 83.3.

Column (4) represents a current average length of stay for each age-sex category based on data from the present study. For males under age 15 discharged from the hospitals in SMSA-C the average length of stay is 6.4 days.

Worksheet B

Bed Need Projection: Service Area of SMSA-C Hospitals: 1980*

Bed Type	Population Subgroup	(1) Current Population (1000)	(2) Estimated Annual Current Number of Discharges	(3) Current Discharge Rate (Discharges/ 1000 pop.)	(4) Current Average Length of Stay	(5) Projected Discharge Rate (Projected Discharges/ 1000 pop.)	(6) Projected Average Length of Stay	
MEDICAL/SURGICAL				(2) ÷ (1)				
	Males 15-44	40.123	3,828	95.4	6.0	91.7	6.8	
	Males 45-64	11.780	1,924	163.3	9.4	179.1	9.3	
	Males 65+	4.504	1,394	309.5	13.2	367.0	11.6	
	Females 15-44	37.326	4,505	120.7	5.7	144.7	5.8	
	Females 45-64	12.512	1,932	154.4	9.2	184.7	9.0	
	Females 65+	6.848	1,954	285.3	11.3	323.5	12.5	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
PEDI-ATRIC	Males < 15	19.664	1,638	83.3	6.4	78.8	4.5	
	Females < 15	18.838	1,270	67.4	6.2	61.8	4.6	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
OB	Females 15-44	37.326	3,710	99.4	4.9	99.4	4.9	
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

* (This projection assumes continued rapid population growth, discharge rates approximating national rates, and average lengths of stay approximating national averages.)

(7) Projected Population (1000)	(8) Projected Number of Patient Days	(9) Projected Average Daily Census	(10) Projected Rate of Occupancy (Occupied Beds/100 Beds)	(11) Projected Bed Need	(12) Current Bed Supply	(13) Anticipated Bed Supply Change	(14) Bed Surplus/ Deficit
	(5)x(6)x(7)	(8) ÷ 365		(9) ÷ (10)			(12)+(13) -(11)
47.345	29522.45	80.88	.85	95.16			
13.900	23152.26	63.43	.85	74.62			
5.314	22622.00	61.98	.85	72.92			
44.044	36964.37	101.27	.85	119.14			
14.764	24542.20	67.24	.85	79.10			
8.081	32677.54	89.53	.85	105.33			
[redacted]	[redacted]	[redacted]	[redacted]	547	480	+50	-17
22.177	7863.96	2[illegible].55	.70	30.78			
21.201	6027.02	16.51	.70	23.58			
[redacted]	[redacted]	[redacted]	[redacted]	55	56	+15	+16
44.044	21452.07	58.77	.70	83.9			
[redacted]	[redacted]	[redacted]	[redacted]	84	82	+ 0	- 2
			Totals	686	618	+65	- 3

Column (5) presents the projected rate of discharges per 1,000 population. Such a rate may be based on data from this study or on extant data. In Worksheet B the discharge rate used is based on national rates published by the National Center for Health Statistics for 1973.[20] For males under 15 this rate is 78.8.

Column (6) presents the average length of stay projected for 1980. In Worksheet B this is again based on national average lengths of stay.[21] For males under 15 this average length of stay is 4.5 days.

The projected population for 1980 presented in column (7) is based on a cohort survival methodology,[22] and appropriate estimates of migration. For males under age 15 the projected 1980 population is 22,177.

The projected number of patient days presented in column (8) is the product of the numbers in columns (5), (6) and (7). Worksheet B projects 7,863.96 patient days for 1980 for males in the under 15 age group.

Column (9) presents the projected average daily census which is the result of dividing the figure in column (8) by the number of days in a year (365). For males under 15 years of age the projected average daily census for 1980 is 21.55.

Projected rate of occupancy, which appears in column (10), represents an estimate of the expected percent of occupancy. It may be based on data describing current occupancy rates, or on some decision about what constitutes an acceptable occupancy rate. This example applies a standard occupancy rate for each type of bed.

Dividing the figure in column (9) by the figure in column (10) produces the projected bed need in column (11). It should be noted that the total need for each type of bed has also been inserted in column (11), in rows 7, 10 and 12. For males under 15 the projected need for beds is 30.78. In Worksheet B this figure is added to the projected bed need for females under 15 and rounded up to the next whole bed to produce a projected need of 55 pediatric beds.

Column (12) displays the current supply of beds of each type, while column (13) displays anticipated changes in bed supply. In the present example it is known that one hospital has a 65 bed addition under construction. This addition of 50 medical-surgical and 15 pediatric beds is indicated in column (13).

The figure in column (14) represents the anticipated surplus or deficit of each type of bed. It is calculated by adding the figures in columns (12) and (13), then subtracting column (11).

Worksheet B presents only one version of this bed need projection. It is suggested that agencies calculate three estimates of bed need for 1980: estimate A, a minimum estimate based on a small population increase, few discharges and short lengths of stay; estimate C, a maximum estimate based on assumptions at the opposite extreme, and extimate B, a "best" estimate, such as that displayed in Worksheet B.

The latter is a "best" estimate in the sense that it is most consistent with the agency's perceptions of what the situation will be in 1980. Rapid growth has been the norm for two decades in SMSA-C and seems to be continuing. Fertility has been relatively high and this has resulted in high discharge rates for obstetrical beds. It has been assumed that this pattern will continue. Discharge rates for pediatric beds, and lengths of stay for pediatric patients have been well above the national average, perhaps because of a current oversupply of pediatric beds.

In developing estimate B it was assumed that lengths of stay and discharge rates would be at the national average for both pediatric and medical/surgical beds. It was also assumed that no change would occur in the length of stay or discharge rate for obstetrical beds. For medical/surgical beds the national rates represent only slight changes from the observed discharge rates and lengths of stay. For pediatric beds, however, these rates are considerably below those for Central HSA and for SMSA-C. The decision to apply national rates in this case represents as assumption that present high discharge rates and lengths of stay are not likely to continue.

Calculation of the projected bed need and projected supply of beds for 1980 (Worksheet B) indicates that, given the assumptions noted above, there will be a deficit of 17 medical surgical beds, a surplus of 16 pediatric beds and a deficit of two OB beds in 1980.

If, however, we assume that discharge rates and average lengths of stay will remain unchanged, the results will be quite different. The data in Worksheet C indicate that if current discharge rates and lengths of stay persist for pediatric patients a deficit of ten pediatric beds will exist in 1980. Thus, a change in assumptions regarding the discharge rate and the average length of stay for pediatric patients causes a change of 26 beds in the need projection for 1980.

Changes in the population projections, changes in projected average length of stay or projected discharge rates and different assumptions about occupancy rates for various types of beds will each cause changes in the projection of bed need. Thus, calculation of a high estimate, a low estimate and a "best" estimate, as suggested here, will provide the planner with both a single best estimate of the need for each type of bed, and a range of high and low estimates of the need for each type of bed.

Several of the advantages of this bed need projection should be noted. Calculation of bed need projections for specific age-sex groups allows the need projection to be linked with refined population projection techniques. Furthermore, this method allows the unique lengths of stay and discharge rates associated with each age-sex group to be considered in projecting bed need.

Occupancy rates in column (10) may also be adjusted to reflect the circumstances in a particular HSA. Agencies may wish to set a

Worksheet C

Pediatric Bed Need Projection
Service Area of SMSA-C Hospitals, 1980*

Bed Type	Population Subgroup	(1) Current Population (1000)	(2) Current Number of Discharges	(3) Current Discharge Rate (Discharges/ 1000 pop.	(4) Current Average Length of Stay	Pr Dis
PEDIATRIC	Males 15	19.664	1,638	83.3	6.4	
	Females 15	18.838	1,270	67.4	6.2	

(7) Projected Population	(8) Projected Number of Patient Days	(9) Projected Average Daily Census	(10) Projected Percent Occupancy	(11) Projected Bed Need	(12) Current Bed Supply	B
22.177	11,823.00	32.39	.70	46.27		
21.201	8,859.47	24.27	.70	34.67		
				81	56	

*(This projection assumes continued rapid population growth and no change rate or average length of stay)

Worksheet C

Pediatric Bed Need Projection
Service Area of SMSA-C Hospitals, 1980*

	(1)	(2)	(3)	(4)	(5)	(6)
on	Current Population (1000)	Current Number of Discharges	Current Discharge Rate (Discharges/ 1000 pop.	Current Average Length of Stay	Projected Discharge Rate	Projected Average Length of Stay
5	19.664	1,638	83.3	6.4	83.3	6.4
15	18.838	1,270	67.4	6.2	67.4	6.2

(8)	(9)	(10)	(11)	(12)	(13)	(14)
rojected umber of tient Days	Projected Average Daily Census	Projected Percent Occupancy	Projected Bed Need	Current Bed Supply	Antici-pated Bed Supply Change	Bed Surplus/ Deficit
,823.00	32.39	.70	46.27			
,859.47	24.27	.70	34.67			
			81	56	+15	-10

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ion assumes continued rapid population growth and no change in discharge
ge length of stay)

standard occupancy rate for each type of bed, as in Worksheet B and C, or base occupancy rates on empirically observed rates for regions within the HSA (see Chapter 7 in Section III).

Each of the variables mentioned above allows flexibility in the bed need projection. This flexibility makes it possible to estimate the impact of a variety of economic and demographic changes on the community's need for beds. The impact of changes in length of stay or discharge rates which might result from changes in the financing of medical care can be estimated using this technique. Similarly, changes in the need for beds resulting from changes in the community's age structure may be considered.

Finally, this technique allows the need for specific types of beds to be projected. Thus, the refinements offered by this projection technique allow the planner to make explicit the assumptions about length of stay and discharge rate which are explicit in the Hill-Burton formula (and to vary these assumptions as they cannot be varied in the Hill-Burton formula) and to arrive at need projections for specific types of beds.

In summary, the data from this study have a variety of potential uses. As indicated earlier, they may be used for general descriptive purposes, description of patient flow patterns and an examination of length of stay patterns. Their utility in estimating future bed need has been described in detail.

Because the study is somewhat complex and will involve considerable cost in terms of time and money, it is expected that some agencies will wish to exhaust the potential uses of the data. In such cases, an analysis plan must be developed early in the study process. This plan will then be reflected in the selection of variables, number of discharges abstracted, etc. The potential for extending the use of these data beyond the major uses described here will be dependent upon the care with which an analysis plan is prepared.

Appendix A

AHA and NCHS Definitions Relevant to Hospital Inpatient Utilization

There are several definitional differences between the two major organizations which publish national data on hospital inpatient utilization: The American Hospital Association (AHA) and The National Center for Health Statistics (NCHS). This problem is further compounded by the fact that for each organization, different publications vary in terms of inclusion of certain types of hospitals. We have chosen to use NCHS definitions, usually from the Hospital Discharge Survey discussed below, wherever possible.

The major definitional differences between AHA and NCHS, which should be kept in mind when making comparisons between the data collected via this study and AHA data, are as follows:

- AHA's Hospital Statistics excludes osteopathic hospitals from its aggregate statistics. Also excluded are hospitals not registered with the AHA. However, the Guide to the Health Care Field, published annually by the AHA, does list osteopathic hospitals, and at least some hospitals which are not registered with the AHA.

- The Master Facility Inventory (MFI) conducted by NCHS results in an annual Master Facility List (MFL) which contains the names and addresses of all known inpatient health facilities (including osteopathic hospitals) in the U.S. Data from the Master Facility Inventory Surveys, a system of planned censuses of the inpatient health facilities on the MFL, is published annually in Health Resources Statistics. Copies of the MFI Hospital Survey data tape, as well as printouts of these data, are available from NCHS. The cost for each tape is $200.00, while the printouts cost $150.00 each.

- NCHS also publishes hospital inpatient utilization estimates based upon the Hospital Discharge Survey, a continuous nationwide sample survey, in Series 13 of Vital and Health Statistics and as selected supplements of its Monthly Vital Statistics Reports. These data are collected only from non-Federal short-stay hospitals. While there is no statement as to the inclusion of osteopathic hospitals, it can be inferred that these are included, since the MFL lists them. Since AHA includes registered Federal hospitals in its Hospital Statistics, these two data sets are not strictly comparable.

'Furthermore, since the Hospital Discharge Survey includes short-term special hospitals and NCHS' MFI apparently tabulates these separately, as does AHA in Hospital Statistics, care must be taken in making comparisons among these data sets.

Since the definitions offered for this study of hospital inpatient utilization are compatible with those used in the NCHS Hospital Discharge Survey, the preceding cautionary remarks apply to comparisons made between this data set and data from AHA's Hospital Statistics and the NCHS Master Facility Inventory Hospital Survey.

Appendix B

Instructions to Medical Record Staff

PLEASE REMEMBER TO RIGHT-JUSTIFY ALL NUMBERS AND CODES!

PRINCIPAL DIAGNOSIS

ICDA-8
CODE
023.0 =

0	2	3	0	<----- Correct
2	3	0		<----- Incorrect

Please record data on all variables for every patient discharged from this hospital during the two-week study period. All patients discharged from each study hospital after 00:01 hours on the first day of the study and before 24:00 hours on the last day of the study should be included. If the requested data item is not contained in the patient's medical record, leave a blank space. Hospitals outside of Central HSA should only report on patients discharged who are residents of Central HSA. A patient who is being transferred from an acute unit to a long-term unit within a hospital is considered to be discharged on that day and must be reported as such.

Disregard the numbers in parentheses under each column title. These are for data processing purposes only.

MEDICAL RECORD NUMBER

The medical record number of the patient will not be computerized or used for any reports but will only be used as a means of resolving questions or making corrections to the other data reported. If medical record number is not recorded, there will be no easy way to make corrections or answer questions concerning a particular patient if data is missing or appears to be in error. If the number is recorded, a phone call to the hospital should quickly solve the problem.

RESIDENCE

Record both the patient's county of residence and his zip code.

If either county or zip code is unknown, record the patient's city or town of residence.

There are two lists appended to these instructions. The first is a list of county codes for Central HSA and surrounding counties. Find the patient's county on that list and enter the numeric code on the abstract form. For out-of-HSA residents record the appropriate state code from the special list after the county numbers. If the county name is unknown, record the city or town in the "City or Town" column.

The second list is a list of zip codes for cities and towns in Central HSA. Record the 5-digit zip code for the residence of the patient. If zip code is unknown, record the city or town of residence. For out-of-HSA residents also record the city or town; if these are out-of-state residents enter the appropriate state code from the list described in the preceding paragraph.

SEX

Record 1 for male and 2 for female.

DATE OF BIRTH

Record the patient's month, day, and year of birth. Use the following month conversion chart for recording this and all other dates:

MONTH CONVERSION CHART

Month	Numeric Code
January	01
February	02
March	03
April	04
May	05
June	06
July	07
August	08
September	09
October	10
November	11
December	12

PRINCIPAL PROCEDURE AND DATE

Code principal procedure using the ICDA-8 3-digit procedure codes. To the right of the procedure code, enter the month, day and last two digits of the year on which the principal procedure was performed.

The principal procedure is either a procedure performed in an operating room or one deemed to be significant (i.e., carrying an operative or anesthetic risk or requiring highly trained personnel or special facilities or equipment). The principal procedure may be distinguished from other significant procedures if it was performed for definitive treatment rather than for diagnostic or exploratory purposes or was necessary to take care of a complication, and/or if it was the procedure most related to the principal diagnosis.

NUMBER OF PROCEDURES

Indicate how many (up to 9) procedures were performed.

DISPOSITION

Use the following codes for disposition:

1 - discharged to home (routine discharge)

2 - left against medical advice

3 - discharged or transferred to nursing home

4 - discharged or transferred to another hospital

5 - discharged or transferred to other type of inpatient health facility

6 - discharged or referred to an organized home care service

7 - died

SERVICE

Use the following categories and codes for the service to which the patient was admitted (the organized clinical department of the medical staff which assumes the primary responsibility for the care of the patient):

1 - Medical/Surgical

2 - Obstetrical

3 - Pediatric (all patients under the age of 15)

Hospital live births are not to be assigned a service category, unless they remain in the hospital after the mother has been discharged, in which case they are to be classified as "pediatric."

In hospitals without a medical staff organized by clinical service or departments, this column is to be left blank.

ADMISSION DATE

Record day, month and the last two digits of the year of admission, e.g., if the patient was admitted in 1974, on December 30, code as follows:

30 12 74

DISCHARGE DATE

Record only the day of the month on which the patient was discharged, e.g., 15 (October).

PRINCIPAL PAYMENT SOURCE

Record the patient's expected principal source of payment at the time of admission. This should be the single source which the patient expects to cover the largest proportion of his hospital bill. Use the following codes:

1 - Self-pay

2 - Workmen's Compensation

3 - Medicare

4 - Medicaid

5 - CHAMPUS

6 - Other government payment

7 - Blue Cross

8 - Other private insurance company

9 - Prepaid or group insurance plan

10 - No charge (free, charity, special research or teaching

11 - Other

Chapter 13

A Study of the Utilization of Nursing Home Facilities

I

STUDY METHODOLOGY

This is primarily a study of the characteristics of patients admitted to and discharged from nursing homes within the HSA during a one month period. A number of studies, both those conducted at a national level and those conducted by local agencies, have focused on aspects of long-term care services utilization. The most useful of these are cited in references 1 through 9 at the end of Section IV. There are two reasons why the HSA staff involved in conducting a survey of nursing homes may wish to become familiar with such studies: 1) there are a number of problematic aspects to collecting nursing home data, such as wariness of administrators, inadequate record keeping practices and definitional problems of designating a study universe, and it may be useful to note how such problems have been dealt with, if not resolved, by others and 2) where the definitions and methods used in this study resemble those used in other studies, general comparisons between results may be made. One of the significant differences between this study and most others is the selection of admissions and discharges rather than residents as the unit of analysis. The decision to collect data on admissions and discharges was based primarily upon the judgment that methods for sampling the characteristics of residents had been amply documented elsewhere, should the HSA prefer this approach. Surveys of residents have the advantage of generating a large number of cases upon which to base descriptions of utilizers' characteristics. On the other hand, they have disadvantages related to cost and/or data quality, as well as to the lack of capability to produce accurate information on length of stay from data on residents rather than discharges.

A. Definition of Concepts

Several concepts used in this study require definition. These are "nursing home," "admission," "discharge" and "length of stay.".

- Nursing Home:* A nursing home is defined as any facility within the HSA which provides nursing care and is not physically part of another institution (such as a hospital, rest home, retirement home, etc.). These facilities may be of two types:

  a nursing care home--one in which at least 50 percent of the residents receive one or more nursing services, and where at least one registered nurse (RN) or licensed practical nurse (LPN) is employed 35 hours or more per week. Nursing services include nasal feedings, catheterization, irrigation, oxygen therapy, full bed bath, enema, hypodermic injection, intravenous injection, temperature-pulse-respiration, blood pressure, application of dressing or bandage, and bowel and bladder retraining.

  a personal care home with nursing--one in which (1) some of the residents but less than 50 percent receive nursing care or (2) more than 50 percent of the residents receive nursing care but no RN's or LPN's are employed full-time on the staff.

- Admission: An admission is defined as any patient accepted for service in a nursing home within the HSA during the study period.

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*This definition was selected to be compatible with that used in the nursing home component presented in A Guide to the Development of Health Resource Inventories. That component also included two other types of long-term care institutions: personal care homes without nursing and domiciliary care homes. These two types of homes were excluded from the present study since, for purposes of bed need projection, information about the utilizers of domiciliary care facilities is not as relevant as data concerning patients who use nursing care services. Also, the emphasis of personal care homes without nursing and domiciliary care homes is upon the housing, rather than the health, needs of aged persons. Health planners who have an interest in this area may wish to coordinate their planning efforts with Areawide Agencies on Aging who have responsibility for planning for the housing needs of the elderly.

- Discharge: A discharge is defined as any patient who died, was transferred to another institution or discharged to home during the study period. Patients transferred within the home itself are not to be counted as "discharges." A patient is to be considered discharged if the home is free to fill the bed formerly occupied by the patient with a new patient. Theoretically, a patient who was discharged during the study month to, for example, an acute care hospital and then re-admitted to the home could be counted as both an admission and a discharge (and, under some circumstances, the patient could even be counted twice as an admission and once as a discharge).

- Average Length of Stay: For purposes of this study, average length of stay is the total number of patient days accumulated by patients discharged from the nursing homes during the study period, divided by the number of patients discharged. The number of patient days for each discharged patient is computed by counting all days from (and including) the date of admission to (but not including) the date of discharge. A stay of less than one day (admission and discharge on the same day) is counted as one day in the summation of total patient days.

B. Definition of Variables

The following variables have been selected due to their utility for descriptive and analytic purposes and the feasibility of obtaining them. Data are to be collected for both admitted and discharged patients; however, these data have some commonality and some differences.

For each facility, for each day of the month of the study period:

- nursing home identifier: a unique number assigned by HSA staff to each nursing home (which should be entered on instruments prior to their distribution). This number should be identical to the number used to identify nursing homes for inventory purposes. It may be further coded to reflect characteristics of homes such as whether they provide skilled or intermediate nursing services, the county of location, etc. Nursing home identifier will be included as a variable in every coded data file.

- daily census: the number of patients in residence as of 5 p.m. A patient is to be counted as in residence if his or her bed is not available for use by another patient. For example, if the patient is simply spending the day or night away from the facility, he or she is to be counted in the daily census.

For each admitted and discharged patient:

- medical record number: if medical records are not numbered, some unique identifier is to be assigned to each admitted and discharged patient and this number is also to be noted on the medical record. HSA study staff should note, after their instruction session with data collection personnel, any institution with unusual record filing systems and implement feasible procedures for retrieving records to check missing data, etc.

- principal payment source: the expected/actual principal source of payment for the patient's bill at the time of admission/discharge. The "principal" source is the single source which covers the largest proportion of the bill. Recommended categories are:*

  own income or family support (private plans, retirement funds, social security, etc.)

  Medicare (Title XVIII)

  Medicaid (Title XIX)

  other public assistance or welfare

  church support

  VA contract

  initial payment-life care

  no charge is made for care

  other

- sex: male or female.

- date of birth: the month, day and year of the patient's birth.

For each admitted patient:

- residence: the patient's county of residence immediately prior to admission (according to a one- or two-digit code).

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*These categories are identical to those used in the 1973-74 sample survey of nursing homes conducted by NCHS' Division of Health Resources Utilization Statistics.

·type of prior residence: the patient's type of residence immediately prior to admission, according to the following categories:*

private apartment or house

general or short-stay hospital

mental hospital or other long-term specialty hospital

another nursing home or related facility

boarding home

other or unknown place

For each discharged patient:

·date of admission: the month, day and last two digits of the year in which the patient was admitted.

·disposition: the destination specified at the time the patient left the nursing home. Recommended categories are:**

to home

to a general hospital

to another nursing home

to rest home, domiciliary care home, personal care home

died

to other or unknown place

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*These categories are comparable to those used in the 1973-74 sample survey of nursing homes conducted by NCHS' Division of Health Resources Utilization Statistics (see reference 8).

**These response categories are similar to those used in the Metropolitan Health Planning Corporation of Cleveland's "Long-Term Care Facilities" Study (see reference 1).

C. Study Instrument

These data may be collected by use of the instrument on the next page, a copy of which is to be completed daily in each nursing home over the course of the study period. The apparent complexity of the instrument is due to the fact that it is designed to simultaneously capture information about the nursing home itself, as well as patients who are admitted and/or discharged during the time of the study. Once it is fully explained, the form is far less formidable than it appears.

Figure 1

Central HSA Nursing Home Study: Data Collection Form

1. Nursing Home Identifier:______________________

2.

study date:

	3. COUNTY CODE	4. TYPE OF PRIOR RESIDENCE	5. PRINCIPAL PAYMENT SOURCE	6. SEX	7. DATE OF BIRTH	8. DATE OF ADMISSION	9. DISPOSITION
MEDICAL RECORD #: admissions:						▨	▨
discharges:	▨	▨					

daily census at
5 p.m.:________

D. Data Collection Design

The data to be collected in this study can refer to any one of three units of analysis: the nursing home itself, admissions or discharges. The respective universes are, therefore, all nursing homes in the HSA during the study period, all admissions to those homes, and all discharges from those homes. Because it is expected that most HSAs will have relatively few nursing homes, it is assumed that data will be gathered in each of them. Furthermore, since nursing homes are usually not extremely large (for the nation, the average number of beds per nursing home in 1973-74 was 75)[10] and turnover tends to be low, a one month period of data collection is suggested. This should provide an adequate data base for examining admissions and discharges, while not making unreasonable data collection demands on the administrative personnel of the facilities.

In HSAs where the number of nursing homes is very small or where patient turnover is particularly low, it may be necessary to collect these data over a two month period.

Because no sampling of institutions or patients takes place, the only issue of representativeness concerns the typicality of the study period. The HSA should therefore avoid implementing this study during the Thanksgiving to New Year holiday period.

E. Field Procedures

Pretesting

Since the instrument is to be completed by nursing home personnel, it must be pretested with some care. This is partly due to the fact that nursing homes are likely to have diverse organizational systems and record keeping procedures. Definitions of discharges, beds, etc., may well vary from one institution to the next but must be standardized for purposes of the study. Hence, very clear instructions must accompany the instrument (see Appendix A). The only method whereby the HSA can have a priori assurance that the instrument and instructions are clear is by conducting a pretest.

A relatively small number of nursing homes can be contacted for this purpose, but care should be taken to make sure that those selected include institutions of various sizes and types. The administrators of the selected nursing homes should be contacted personally by a senior member of the HSA study staff, and a meeting arranged. The instrument should be gone over in detail and any problems or questions carefully noted. If it seems valuable, the selected nursing homes might be provided with an appropriate number of forms and asked to complete them for a period of approximately one week. If the administrators feel the instrument and instructions are clear, this latter exercise may not be necessary. During the pretest period, a series of specific questions relating to the expected quantity of data must be answered. Previously collected data (from the nursing home inventory component described in A Guide to the Development of Health Resource Inventories), as well as information gathered through discussions with administrators, will provide the HSA with a method of estimating the total number of admissions and discharges likely to occur in each nursing home over the one month study period. The example data collection instrument discussed earlier provides spaces for six discharges and admissions per day and may have to be expanded for larger homes. On the other hand, some nursing homes may have very few admissions or discharges over a one month period. In order for these type of data to be useful, a total number of cases adequate to provide reliable estimates when cross-tabulated by such variables as age, sex, length of stay and residence must emerge from the study.

Procedures to Elicit Study Participation

HSAs must acknowledge the reality that in recent years nursing homes have been the object of considerable adverse publicity, and that, as a result, some may be very reluctant to cooperate in studies of this kind. Hence, it may be necessary to direct substantial efforts toward assuring the nursing home administrative personnel that the study does not represent a threat. Unlike many of the other studies described in this Handbook, a press release is, therefore, not recommended. Unless precise wording can be controlled, such advance description of study intentions may be counter-productive.

Contact between a senior HSA staff person and any relevant organization of nursing home owners or operators may be useful, as will a careful attempt to maximize cordial interaction between study staff and administrators who participate in the pretest. However, the primary effort to gain cooperation must be a carefully written introductory letter to each institution. This will be dispatched prior to the selected study period and will briefly describe the study, outline its value, emphasize that data will be analyzed in aggregate form only and request the assistance of each nursing home. The HSA's willingness to answer any questions and to share resulting data should be noted. This letter should also specify the selected study period and indicate that necessary study materials will be forwarded at a future time.

Data Collection Personnel

The data are to be collected by nursing home personnel. Although the initial contact person will typically be the administrator, he or she may wish (this might be suggested by the HSA) to assign the task to an assistant.

The HSA should record the name of the person who is completing the forms in each institution in order to facilitate later contacts. The data collection personnel will receive no formalized training, but will be provided with detailed instructions.

Data Collection Procedures

Approximately one week prior to the start of the study period, a complete package of survey materials will be mailed or delivered to each participant nursing home. This package will include:

- a requisite number of instruments, i.e., one for each day of the study period plus additional forms as necessary for larger nursing homes
- a complete set of instructions for the completion of the forms, including the suggestion that a specific person be designated as responsible for the task
- a postage paid envelope addressed to the HSA for use in returning the completed forms
- an appropriate cover letter which includes the name and telephone number of the HSA staff member who should be contacted if any questions arise.

One or two days prior to the beginning of data collection, and again during the data collection period each nursing home should be contacted by telephone. The first of these contacts is primarily intended as a reminder that the data collection is about to begin. It may also serve as an additional opportunity for the HSA to respond to questions and reduce any remaining reluctance on the part of nursing home personnel. The second contact serves the public relations function of emphasizing to the nursing homes that the HSA is committed to the collection of good quality data. It also provides an opportunity to resolve any unforeseen questions that have arisen during actual data collection and to check on the extent to which the nursing homes are cooperating in the study.

Following completion of the study period, and after allowing for reasonable mailing time, any nursing homes which were thought to have been cooperating but which have not yet returned the completed forms must be contacted, and efforts to obtain the data (if they were in fact collected) should be made. In addition, the HSA should consider dispatching thank you letters to the administrators of those homes which participated. This will be particularly useful if the HSA has any intention of replicating the study at some future point in time, or instituting other data activities in the area of long term care.

Quality Control

As is always the case when data collection is performed by persons other than study staff, the quality of data is essentially beyond the direct control of the latter. It can, however, be affected before the fact by the use of a straightforward instrument and the provision of detailed instructions. After the data have been returned, instrument entries should be individually checked for completeness and consistency. To the extent possible, problems should be resolved by contacting the person who was responsible for data collection.

F. Data Processing and Storage

It is clear that these data can be examined using one of several units of analysis. It is therefore suggested that two separate data files, one representing admissions, the other discharges, be prepared. A third file, referring to the homes themselves and containing aggregate data describing admissions, discharges, daily census and data from the nursing home inventory component, might also be prepared. Another approach would be to simply add the nursing home data derived from this study to the already existing inventory file described in A Guide to the Development of Health Resource Inventories. Example codebooks for the former two files are provided in Appendix B. The data can be keypunched directly from the instruments. Keypunching should be verified.

II

DATA ANALYSIS AND USE

This section will present and describe displays of data from the present study and from the nursing home inventory which are useful for 1) a general description of nursing home availability and the characteristics of admitted and/or discharged patients; 2) a description of the geographic patterns of nursing home admissions; 3) a description of the length of stay patterns of patients discharged from nursing homes; and 4) the estimation of future nursing home bed need.

A. General Descriptive Uses of Data on Nursing Homes, and Admitted and Discharged Nursing Home Patients

As noted earlier, certain information on nursing homes will already have been collected prior to the administration of this study. As indicated above under "Data Processing and Storage" such data can either be stored in a separate but related file, or simply extracted and tabulated from the inventory instruments. Implementation of the nursing home inventory component described in A Guide to the Development of Health Resource Inventories is assumed to have resulted in at least the following data items being available for each nursing home within the HSA which are relevant to the present study:

- ownership
    - government
    - proprietary
    - nonprofit-church related
    - other nonprofit
- number of beds by certification status

  - licensed bed capacity
  - number certified for Medicare
  - number certified for Medicaid
    - skilled
    - intermediate
  - number set up and staffed for use
- annual number of admissions
- current patient census

These items can be used to describe nursing homes, either alone or in conjunction with data from the present study. In addition, the items "annual number of admissions" and "current patient census" may be compared with data obtained from this study as a check on the representativeness of data from the study month, since data from this study should represent approximately 1/12 of the yearly admissions for the HSA. However, if inventory data are significantly older than the present study data, it is possible that factors other than non-representativeness are responsible for discrepancies. For example, a home may have added beds during the interval between administration of the inventory and administration of the present study. It is assumed, however, that this study will be administered shortly after the most recent update of the nursing home inventory component.

In the discussion and data displays which follow, fictional data for Central HSA have been employed for exemplary purposes. It should be noted that data from a study of this duration do not allow description of individual nursing homes or patients admitted to and discharged from particular homes. In smaller HSAs, an insufficient number of cases in each relevant analytic category may mean that certain cross-tabulations of these data are ruled out. In general, the data from the study do allow patterns for the entire HSA to be described.

The sources for the data presented in Table 1 are the nursing home inventory component contained in A Guide to the Development of Health

Table 1

Admission Per Bed Ratio for Nursing Homes, by Size Category, Central HSA, 1976

Bed Size*	Number of Homes	Number of Beds	Annual Admissions	Admission/ Bed Ratio
0-19	18	119	56	.47
20-60	122	3,213	2,130	.66
61-100	27	1,751	2,059	1.18
101+	33	3,417	2,883	.84
Total	200	8,500	7,128	.84

*beds set up and staffed for use

Resource Inventories and the present study. The data in Table 1 indicate that the majority of homes in Central HSA are relatively small; 140 (or 70 percent) have 60 or fewer beds. Only 16.5 percent have more than 100 beds. These homes, however, account for 40 percent of the HSAs nursing home beds and admissions. Homes in the 61-100 bed size category account for 21 percent of the beds and 29 percent of the admissions.

One way of comparing the productivity of homes in each size category, shown in Table 1, is to calculate the admission per bed ratio for that category. A higher ratio indicates that the rate of patient turnover is higher. Homes with higher turnover may either 1) have a more "favorable" case mix, or 2) may be more efficient.* In Central HSA,admission per bed ratios are highest for homes in the 61-100 bed size category. The smallest homes have admission per bed ratios lower than the average (.47 for the smallest homes and .66 for homes with 20-60 beds, as compared with an average of .84 for the HSA). The relationship of other institutional characterisitcs, such as type of ownership and certification status, to turnover may also be calculated. If it could be determined that institutional characteristics, rather than patient mix differences, were responsible for low turnover, the HSA might wish to adopt a policy which encouraged the construction of new homes with the most efficient characteristics in areas where more beds are indicated. For example, Cleveland, Ohio's Metropolitan Health Planning Corporation adopted a policy of discouraging the construction of a new facility or the addition of beds to an existing facility which does not provide for a minimum total capacity of 100 beds.[11]

Data on nursing homes may also be analyzed using licensed bed capacity rather than the number of beds set up and staffed for use.

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*This would be true if, as Feldstein asserts for hospitals, decreased costs per case are associated with increased case flow (Martin S. Feldstein, Economic Analysis for Health Service Efficiency, Amsterdam: North-Holland Publishing Company, 1967, p. 129). Planners who wish to apply other productivity measures to nursing home study data should see Chapter 7 in Section III where these measures are employed using hospital data.

This brief discussion has been intended to illustrate how descriptive data on nursing homes could be analyzed and used, for example, to assist in determining general policies regarding desirable size of nursing homes, in order to satisfy legislative requirements such as that stated in P.L. 93-641 concerning the reduction of documented inefficiencies.[12]

Turning to the uses of descriptive data on nursing home admissions and discharges generated by the present nursing home study (inventory data, e.g., bed size, are also used in some of the analyses which follow), Tables 2-7 are presented and discussed.

Table 2 presents a basic description of nursing home utilization in Central HSA in terms of the age and sex distributions of the admissions. Only 10.7 percent of patients admitted to Central HSA during the study month were under age 65. Therefore, it is primarily the aged population in Central HSA which utilizes nursing care services. A high percentage of admissions (38.4) were over age 85. Nursing home admissions were primarily female (70.5 percent) and the females in nursing homes tended to be older than the males. Forty-two percent of the female, but only 31 percent of the male, admissions were over age 85. For both sexes combined there was a higher percentage of admissions in the 85 and over age range than in any other age range. This was also the modal age range for women, but the modal range for men was 75-84.

An alternative display of utilization data is presented in Table 3 for discharged patients. In Table 3, the percentages for each age-sex category are expressed in relation to the total number of discharges, while admission data in Table 2 are expressed simply as percentages of the total in each sex category.

Table 4 further characterizes the discharged study population by presenting the total patient days accumulated by patients discharged during the study month. When these are expressed for men and women, by age, as a percentage of total patient days, it can be seen that

Table 2

Number and Percent of Admissions by Age and Sex, Central HSA, Study Month

Age/Sex	Number	Percent
All Admissions	597	100.0
under 65	64	10.7
65-74	90	15.1
75-84	214	35.8
85+	229	38.4
Males	176	100.0
under 65	29	16.5
65-74	36	20.5
75-84	57	32.2
85+	54	30.9
Females	421	100.0
under 65	35	8.3
65-74	54	12.9
75-84	157	37.3
85+	175	41.6

Table 3

Number and Percent of Discharges by Age and Sex, Central HSA, Study Month

	Number	Percent
All discharges	560	100.0
Males	180	32.1
under 65	29	5.2
65-84	95	17.0
85+	56	10.0
Females	380	67.9
under 65	32	5.7
65-84	190	33.9
85+	158	28.2

Table 4

Number and Percent of Patient Days by Age and Sex, Central HSA, Study Month

	Patient Days	
	Number	Percent
All discharges	198,552	99.9*
Males	59,555	29.9
under 65	9,818	4.9
65-84	29,603	14.9
85+	20,134	10.1
Females	138,997	70.0
under 65	13,185	6.6
65-84	69,054	34.8
85+	56,758	28.6

*percentages do not total 100.0 due to rounding women account for 70 percent of the total patient days. It is women aged 65-84 who account for the largest percentage of patient days (nearly 35 percent). Men and women under age 65 account for approximately 12 percent of all patient days generated. Data such as these can be used to further refine bed need projections by adjusting population data to reflect the age and sex structure of discharged nursing home patients.

Table 5 summarizes the principal source of payment data for all admissions to Central HSA nursing homes in the study month.* These data are classified by nursing home size, but could also be presented by ownership or certification status. The data in Table 5 might be helpful in locating potential problems in nursing home accessibility due to a patient's payment source. For example, as shown in Table 5, the smaller nursing homes admitted relatively few or no Medicare patients during the study period. This fact may be explained by the inability or unwillingness on the part of smaller homes to accomodate to the Medicare program's paperwork and bureaucratic requirements or by other factors.[13] Access to nursing homes by size did not appear to be affected, however, by a patient's principal payment source being Medicaid. This is suggested from the data in Table 5 which show that Medicaid patients accounted for the largest or second largest percentage of admissions to all sizes of nursing homes.

Table 6 presents data on patient disposition for patients discharged from Central HSA nursing homes. Twenty-nine percent of discharged patients went home following their nursing home stay; another 34.5 percent were discharged to a hospital or other health facility, 33.9 percent died, and 2.3 were discharged to another or unknown place. The percentage of patients discharged alive may be compared with national data. National norms based upon 1972 data,[14] show that 69 percent of sampled discharges were live discharges; the Central HSA percentage of 66 percent is slightly lower. When making comparisons of this nature, other nursing home discharge characteristics, such as

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*Table 5 could also have been constructed on the basis of the principal source of payment data for all discharges.

Table 5

Percent of Admissions in Each Principal Source of Payment Category, by Size of Nursing Home Central HSA, Study Month

Bed Size		Private Pay	Medicare	Medicaid	Other
0-19	100.0%	80.0%	0	20.0%	0
20-60	100.0%	49.7%	3.4%	46.4%	.6%
61-100	100.0%	57.6%	16.9%	24.4%	1.2%
101+	100.0%	29.9%	28.2%	37.3%	4.6%

N = 597

Table 6

Number and Percent of Discharged Nursing Home Patients by Disposition, Central HSA, Study Month

Disposition	Number	Percent
To home	164	29.3
To hospital	117	20.9
To another facility	76	13.6
Died	190	33.9
To other or unknown place	13	2.3
Total	560	100.0

the age-sex structure of the two populations as well as sampling error in the national estimate must be considered. Disposition data may be further analyzed by the certification status of the home and/or by ownership.

Table 7 presents data on the prior residence of patients admitted to Central HSA nursing homes during the study month. Nearly half of all nursing home patients were admitted directly from a hospital to the nursing home. Data such as these describe the aggregate progression of patients through various levels of care, particularly if a further classification by the level of care provided by the nursing home, such as whether the home is a skilled or intermediate facility, is added from the inventory data file.

B. Description of Geographic Patterns of Nursing Home Admissions

For the purposes of assessing availability of services, locating new facilities, and determining medical service areas, it is useful to have data on the geographic origin of patients being admitted to nursing homes. Furthermore, HSAs are directed by P.L. 93-641 to consider, in reviewing proposed or existing health services, "the need that the population served or to be served by such services has for such services."[15] This requires a determination of the number and residence of relevant "populations."

Two types of questions may appropriately be asked by the HSA planner: 1) patient destination—Where do patients from a particular county receive nursing home care? Do they tend to use nursing homes located within their home county? If not, where are these patients receiving nursing home care? 2) patient origin—Do the homes located in a particular county have only residents of that county in their patient load or is a substantial proportion of their patient load from other counties?

Table 7

Number and Percent of Admitted Nursing Home Patients by Prior Residence, Central HSA, Study Month

Prior Residence	Number	Percent
Home	189	31.6
Hospital	295	49.4
Other nursing home or related health facility	68	11.4
Other or unknown place	45	7.5
Total	597	99.9

Answers to the first type of question (patient destination) are useful for making decisions regarding the availability or accessibility of nursing home services to HSA residents. For example, it might be decided that when half or more of the nursing home patients from a particular county are in homes located outside the county, a problem of availability may exist. Decisions regarding location of new facilities can be based in part upon the analysis of areal utilization patterns suggested by data from the present study.

In assessing the need for, and location of, nursing care facilities, answers to the second type of question are also relevant. A situation may exist, for example, in which a substantial proportion of the patient load of the nursing homes located within a particular county is made up of residents of other counties. In deciding whether or not to permit new beds to be added in such a county, or by a particular home, it is important to determine a realistic medical service area of the home or homes in question. Unfortunately, data for one month on admitted patients' residences may provide too few cases to make judgments on such questions. In this case, homes may be asked to present special tabulations of data regarding the counties of origin of their patients for a longer period of time. Data from this study should, in general, be sufficient to permit appraisal of the extent to which patients who formerly resided in a particular county go to homes located within the county. And, in some areas, the numbers of admissions generated during the study period may be sufficient to allocate precisely to each county a reliable percentage of out-of-county admissions.

Table 8 summarizes the geographic patterns of nursing home admissions in SMSA-B, Central HSA, for the study month.* This basic table is constructed from study data by: 1) for each facility located in county 1, for example, determine the number of persons admitted to the facility who resided in each of the eight counties in SMSA-B;

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*Other methods of displaying patient origin and destination data can be found in Chapter 12 of this section, and Chapter 3 in Section II.

Table 5

Geographic Origin and Destination of Nursing Home Admissions, SMSA-B, Central HSA Study Month

Facility Location	County of Prior Residence								Total**
	#1	#2	#3	#4	#5	#6	#7	#8	
County 1	12	2	1	0	1	2	0	0	18
County 2	0	9	0	0	0	0	0	1	10
County 3	0	2	5	0	1	6	0	1	15
County 4	0	0	1	12	0	1	0	0	14
County 5	1	1	2	0	15	5	1	1	26
County 6	2	1	1	2	2	264	0	1	273
County 7	0	2	1	1	0	1	12	0	17
County 8	0	1	1	1	1	0	0	12	16
Total*	15	18	12	16	20	279	13	16	389

*of all of each county's residents

**of all facility admissions from each county

2) enter the number who resided in county 1 in column (1), the number who resided in county 2 in column (2), etc.; 3) follow the same procedure for the facilities located in each of the other seven counties in SMSA-B. Viewing these data from the standpoint of patient origin, the data in Table 8, for example, show that a total of 18 patients were admitted to the nursing home facilities located in county 1 during the study period. Of these, 12 were residents of county 1, 2 were residents of county 2, 1 was a resident of county 3, etc. From the standpoint of patient destination, the data in Table 8, for example, show that a total of 15 residents of county 1 were admitted to nursing home facilities located in SMSA-B during the study period. Of these, 12 were admitted to nursing homes located in county 1, none in counties 2, 3 and 4, 1 was admitted to nursing home facilities located in county 5, etc.

Two points regarding the data displayed in Table 8 should be noted. The data imply that no one left the SMSA for nursing care, and that all persons admitted to facilities in SMSA-B were residents of that SMSA. This would be unusual, if true, but the assumption has been made in order to simplify data presentation and discussion. Secondly, the numbers in most of the cells of Table 8 are small. Therefore, the description of the geographic origin and destination of SMSA-B nursing home admissions based upon the table must be general. In Figure 2 and Table 9, the data from Table 8 are further analyzed and displayed at the general level demanded by the small number of cases.

Patient Destination

Certain geographic patterns of admission to nursing homes by each county's residents are apparent from Figure 2. With the exception of counties 2 and 3, 75 percent or more of those persons residing in each county who were admitted to a nursing home, were admitted to a nursing home that was located in their own county. The residents of counties 2 and 3 rely more heavily on the resources of other counties for their nursing home services than do the residents of the other

Figure 2

Percent of Residents of Each County in SMSA-B, Central HSA Admitted to Nursing Homes in Own County, Study Month

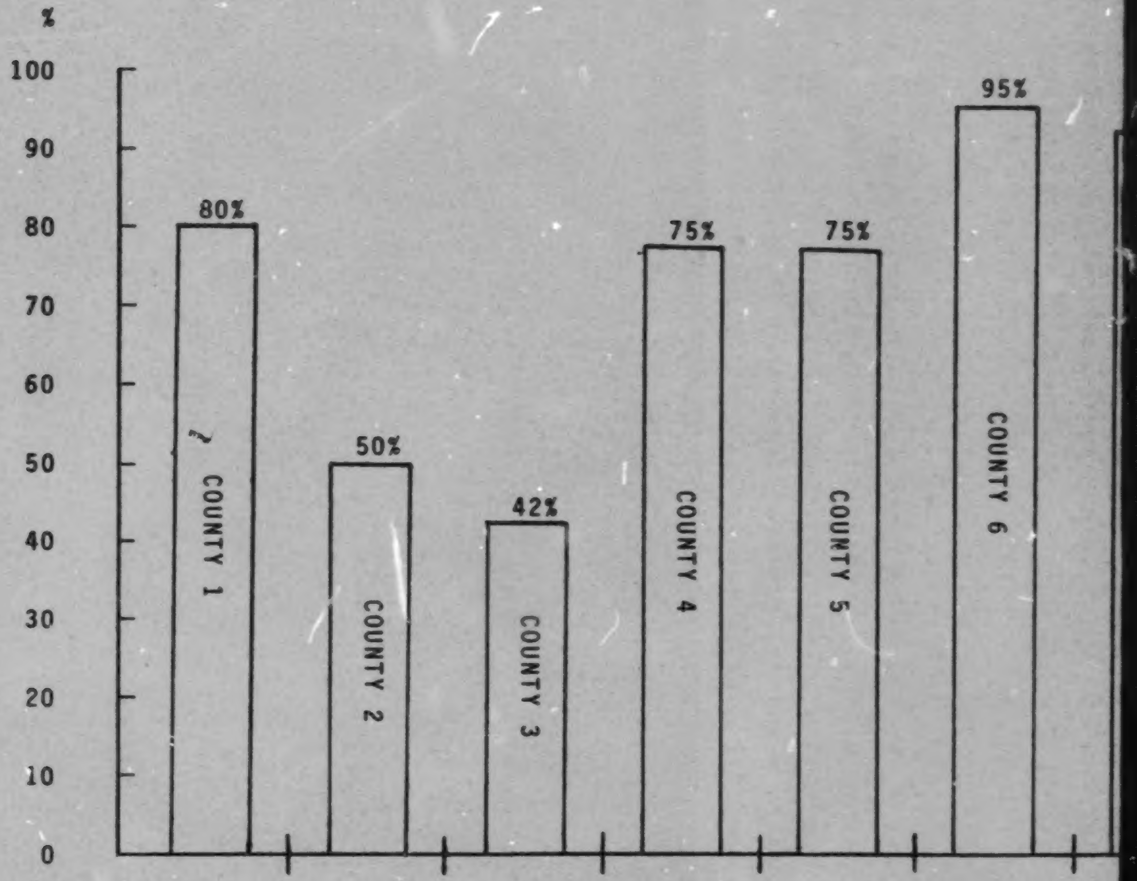
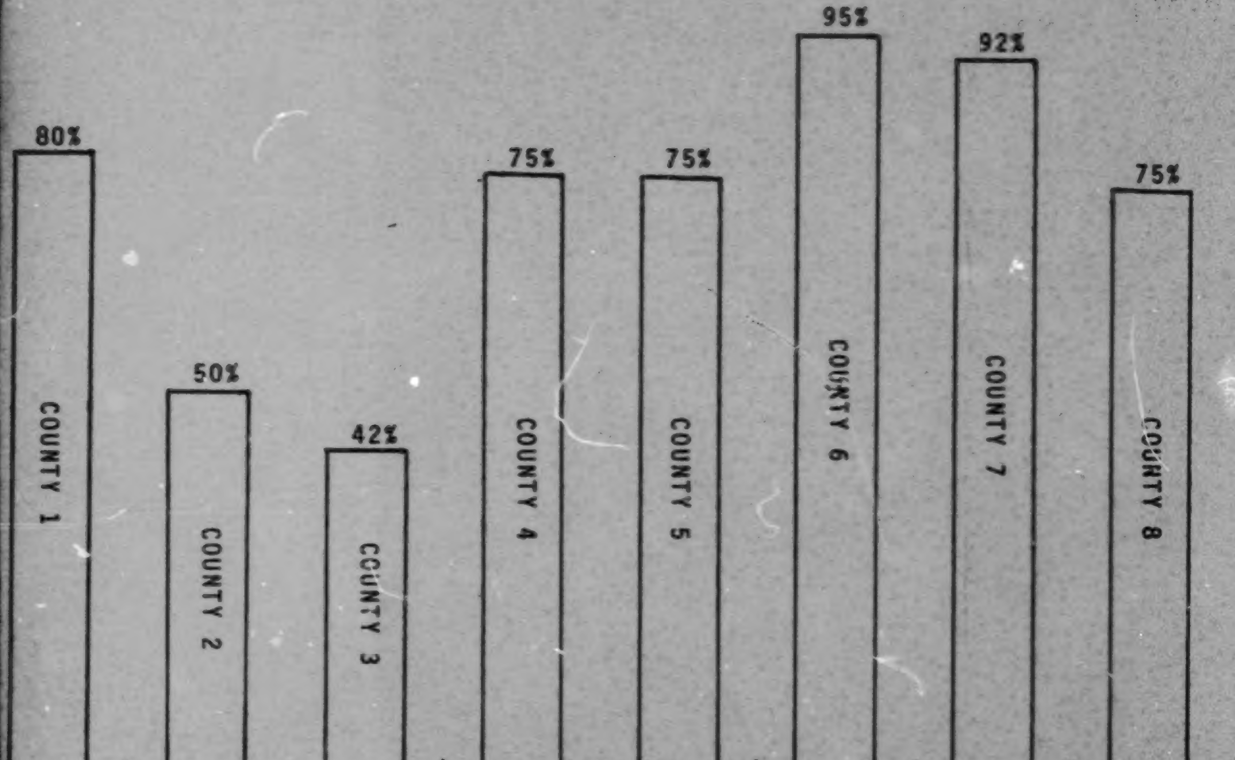


Figure 2

Percent of Residents of Each County in SMSA-B, Central HSA, Admitted to Nursing Homes in Own County, Study Month



six counties in SMSA-B. By the criteria suggested earlier (that when half or more of the patients from a particular county use homes located outside the county, a problem of availability may exist), the residents of counties 2 and 3 may not have sufficient availability of nursing care facilities. HSA staff will wish to determine whether this use of facilities outside of counties 2 and 3 is due to 1) a relative shortage of beds within these counties; 2) other facility characteristics, such as type of ownership or certification of the homes under Medicare and Medicaid; 3) the location of facilities in surrounding counties with respect to the populations of these counties; or 4) other factors.

Where the number of cases available for analysis is sufficiently large, planners will be able to determine medical service areas, and adjust the population denominators for nursing home bed need projections using the approach, described in Chapter 12 of this section, for hospital service area adjustment based on patient destination data.

Patient Origin

Table 9 shows the percent of patients admitted to the facilities located in each county who reside outside of that county. For example, county 3's facilities serve more out-of-county (67 percent) than in-county patients (33 percent). Apparently, then, the fact noted above, that many of county 3's residents are admitted to homes outside of county 3, does not result merely from a lack of nursing home beds in county 3.

Facility location and expansion questions should be based on the extent to which facilities serve their own county's residents and the extent to which they serve the residents of other counties.

Table 9

Percent of Out-of-County Residents Served by Facilities in SMSA-B, Central HSA by County, Study Month

County of Facility Location	Percent Admissions from Out-of-County
County 1	33%
County 2	10%
County 3	67%
County 4	14%
County 5	42%
County 6	3%
County 7	29%
County 8	25%

C. Length of Stay of Discharged Nursing Home Patients

In order to calculate the average length of stay for patients discharged from nursing homes in Central HSA, patient days (number of days from admission to discharge) for each discharged patient are summed over all discharges. This total patient day figure is then divided by the total number of discharged patients. For Central HSA, 560 discharged patients accumulated 198,552 patient days (see Table 4), for an average length of stay of 355 days, or .97 years. More detailed average length of stay data for Central HSA nursing home discharges, broken down by age and sex, are displayed in Table 10. This table shows that Central HSA males 65-84 years have the shortest average nursing home stays, and females under age 65 have the longest average stays.

Table 11 presents the distribution of lengths of stay for Central HSA discharges. The modal stay range for both males and females is 1-100 days, possibly reflecting the fact that Medicare pays for up to 100 days of skilled nursing care.

An alternative, more common, way of determining average length of stay for nursing home residents, rather than discharges, has been to calculate patient days accumulated by residents as of a particular study date, and to divide this number by the number of residents in the facility on that date. This is the method used in several national studies conducted by NCHS.[16] It should be understood that this method yields a higher average length of stay than the method used in this study. This is due to the fact that in a one-day sample of residents, the probability of capturing those patients who have short stays is low while in a one-month study of discharges, the probability of such persons being included is higher and the proba-

Table 10

Average Length of Stay in Years for Discharged Nursing Home Patients by Age and Sex, Central HSA

Age	All discharges	Sex	
		Male	Female
All ages	.97	.91	1.00
under 65 years	1.03	.93	1.13
65-84 years	.95	.85	.99
85 years and over	.98	.99	.98

Table 11

Length of Stay Ranges of Discharged Nursing Home Patients by Age and Sex, Central HSA, Study Month

	all stays	1-100 days	101-365 days	366 days-5 years	>5 years
All Discharges	560	220	171	131	38
Males	180	75	55	39	11
<65	29	12	9	6	2
65-84	95	41	29	20	5
85+	56	22	17	13	4
Females	380	145	116	92	27
<65	32	11	10	8	3
65-84	190	64	62	54	10
85+	158	70	44	30	14

probability of capturing the discharges of long-staying residents is low relative to their inclusion in a survey of residents.*

Data on average length of stay of nursing home discharges, therefore, when used to adjust bed need estimates (as in the following pages), will yield more conservative bed requirements than would similar adjustments made on the basis of resident average lengths of stay. Planners should recognize that one method is not necessarily more accurate than the other; estimates based on discharges will yield low requirements for beds, while estimates based on residents will yield high requirements.

The planner is urged by P.L. 93-641 to consider "the availability of alternative, less costly, or more effective methods" of providing institutional services.[17] Concern over the documented misplacement of patients at higher levels of care than necessary, and the concomitant higher cost of providing nursing home settings for patients who merely require domiciliary care, has been expressed in the literature.[18] It is, therefore, felt that the relatively short average stays shown in this study, when applied to bed need estimating procedures, will have a salutary result.

D. Estimation of Future Nursing Home Bed Need

As discussed in Chapter 12 of this section, State Agencies are required by the provisions of P.L. 93-641 concerning medical facilities plans to set forth the number and type of beds in facilities which provide inpatient care and a plan for the distribution of beds and facilities within the state. The requirements contained in the state's medical facilities plan are to be based on the plans of HSAs within the state. It is assumed that HSAs will be responsible for estimating future nursing home bed need for their health service areas. Data from this study and from the nursing home inventory may be used by HSAs to project need for nursing home beds.

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*Shoshana Falk ("Average Length of Stay in Long-Term Institutions," Health Services Research, Fall 1971, pp. 251-255) discusses this problem and recommends an alternative method of calculating length of stay.

Several methods for estimating the number of nursing home beds required by populations have been proposed and/or used for planning. Citations 20-24 in the references refer to publications which describe such methods. The bed need estimation method presented here is similar to that proposed for use in estimating hospital bed requirements in Chapter 12 of this section. The traditional Hill-Burton formula is adjusted using data on discharges obtained by this study of nursing homes. Since the calculation of the formula is discussed in detail in Chapter 12, here the procedure will merely be briefly presented.

Figure 3 on the following page presents the components of the nursing home bed need calculation for Central HSA for the year 1980. Since 88 percent of the patient days generated by discharges were accumulated by persons 65 years or older (from Table 4), the appropriate population sub-group is the Central HSA population over age 65 [column (1)]. The projection could be further refined by weighting the current and projected population figures [columns (2) and (8)] based on the sex distribution of patient days (from Table 4). The current number of discharges [column (3)] represents all discharges from nursing homes in Central HSA in a year's time. These figures represent an estimate based on the number of discharges in the one-month study period, from Table 3 (12 x 560 = 6720).

The current rate [column (4)] is calculated by dividing column (3) by column (2). Current average length of stay [column (5)] is taken from Table 10 (355 = 365 x .97). The 1980 discharge rate and 1980 average length of stay [columns (6) and (7)] are assumed to remain unchanged from 1976. The projected number of patient days [column (9)] is the product of the numbers in columns (6), (7) and (8). The projected average daily census [column (10)] is the result of dividing column (9) by 365 (days in a year).

Figure 3

Nursing Home Bed Need Projection, Central HSA, 1980

(1) Population Subgroup	(2) 1975 Population (in thous.)	(3) Current Number of Discharges	(4) Current Discharge Rate (Discharges/ 1,000 Pop.)	Cur Len
65+	200	6,720	33.6	
(6) Projected Discharge Rate	(7) Projected Average Length of Stay	(8) 1980 Projected Pop.	(9) Projected Number of Patient Days	Da
33.6	355	230	2,743,440	
(11) Projected Occupancy Rate	(12) Projected Bed Need	(13) Current Bed Supply	(14) Anticipated Bed Supply Change	Be
.90	8,351	8,500	---	

Figure 3

Nursing Home Bed Need Projection, Central HSA, 1980

(2) 1975 Population (in thous.)	(3) Current Number of Discharges	(4) Current Discharge Rate (Discharges/ 1,000 Pop.)	(5) Current Average Length of Stay (in days)
200	6,720	33.6	355
(7) Projected Average Length of Stay	(8) 1980 Projected Pop.	(9) Projected Number of Patient Days	(10) Projected Average Daily Census
355	230	2,743,440	7,516
(12) Projected Bed Need	(13) Current Bed Supply	(14) Anticipated Bed Supply Change	(15) Bed Surplus/ Deficit
8,351	8,500	---	+149

The projected rate of occupancy is based upon a desirable occupancy rate of 90 percent. Projected bed need [column (12)] is the result of dividing column (10) by column (11). Current bed supply [column (13)] in Central HSA is taken from Table 1. No bed supply changes are shown in column (14); however, in most HSAs, approvals for nursing home bed construction exist and may be inserted into the projection here. The figure in column (15) is the difference between projected bed need [column (12)] and current bed supply [column (13)]. For Central HSA a surplus of 149 beds is projected in 1980.

Appendix A

Instructions to Nursing Home Data Collection Personnel

Please fill out one copy of the enclosed form (Central HSA Nursing Home Study Data Collection Form) each day during the study period (May 1-May 31). Use minimal codes only, as indicated in these instructions. Larger homes may find there is not enough space on one form. If this is the case, use a second form. Be sure to enter the correct date in the upper left box which says study date as follows: 5-2-76 (May 2, 1976).

In the lower left box of the data collection form, there is a space to record the home's daily census. Count the number of patients in residence in the home as of 5 p.m. on each day of the study. A patient is to be counted as in residence if his or her bed is not available for use by another patient. For example, if the patient is simply spending the day or night away from the home, he or she is to be counted.

Certain information about all persons admitted to and discharged from the nursing home is to be entered on the form. A person is to be considered discharged if

- he or she has left the home, or
- is transferred to a hospital or other facility and the home is free to put another patient in the bed formerly occupied by this person

MEDICAL RECORD NUMBER: for both admissions and discharges, enter the number which the home has assigned to the patient for identification purposes. The medical record number of the patient will not be computerized or used for any reports but will only be used as a means of resolving questions or making corrections to the other information reported. If medical record number is not recorded, there will be no easy way to make corrections or answer questions concerning a particular patient if data are missing or appear to be in error. If the number is recorded, a phone call to the nursing home should quickly solve the problem.

COUNTY CODE: for admitted patients only, record the patient's county of residence prior to his admission to this nursing home. If the patient was transferred to the home from another institution, record the county in which the patient resided before being admitted to an institution. If county is unknown, record the patient's city or town of residence. There is a list of county codes appended to these instructions. Find the patient's county on that list and enter the numeric code on the data collection form. For residents who do not live within Central HSA, record their residence as 000.

TYPE OF PRIOR RESIDENCE: for admitted patients only, record the type of residence in which the patient lived just before being admitted to this home. Use the following codes:

1 - private apartment or house
2 - general or short-stay hospital
3 - mental hospital or other long-term specialty hospital
4 - another nursing home or related facility
5 - boarding home
6 - other or unknown place

PRINCIPAL PAYMENT SOURCE: for both admitted and discharged patients, record the expected or actual principal source of payment at the time of admission or discharge. For admitted patients, this should be the single source which the patient expects to cover the largest proportion of his/her bill. For discharged patients, this should be the single source which actually covers the largest proportion of the bill. Use the following codes:

1 - own income or family support
2 - Medicare

3 - Medicaid

4 - other public assistance or welfare

5 - church support

6 - VA contract

7 - initial payment-life care

8 - no charge made for care

9 - other

SEX: for both admitted and discharged patients, record a 1 if the patient is male and a 2 if the patient is female.

DATE OF BIRTH: for both admitted and discharged patients, record the patient's month, day and year of birth. Use the following month conversion chart for recording this date:

MONTH CONVERSION CHART

Month	Numeric Code
January	01
February	02
March	03
April	04
May	05
June	06
July	07
August	08
September	09
October	10
November	11
December	12

If the patient was born on September 25, 1899, for example, the number would be recorded as follows: 09-25-1899.

DATE OF ADMISSION: for discharged patients only, record the month, day and last two digits of the year of admission, e.g., if the patient was admitted in 1974, on December 30, code as follows: 12-30-74.

DISPOSITION: for discharged patients only.record the destination specified at the time the patient left the nursing home. Use the following codes:

1 - to home

2 - to a general hospital

3 - to another nursing home

4 - to rest home, domiciliary care home, personal care home

5 - died

6 - to other or unknown place

Appendix B

Example Codebook

Central HSA Nursing Homes Study: Admissions Data

Column(s)	Variable	Source	Codes
1-5	Patient ID	Assigned	10001-n A unique identification code should be assigned to each case. The '1' in the first column indicates that this is an admission data record
6-8	Nursing Home ID	Q1	001-n
9-10	Date of Study	Q2	01-31 Day of study month
11-12	County of Residence Prior to Admission	Q3	01-n county code
13	Type of Prior Residence	Q4	1=private residence 2=general short-stay hospital 3=mental hospital or other long term specialty hospital 4=another nursing home or related facility 5=boarding home 9=other or unknown
14	Principal Source of Payment	Q5	1=private pay 2=Medicare (Title XVIII) 3=Medicaid (Title XIX) 4=other public assistance or welfare 5=church support 6=VA contract 7=initial payment-life care 8=no charge 9=other Blank=unknown

Column(s)	Variable	Source	Codes
15	Patient's Sex	Q6	1=male 2=female 9=unknown
16-23	Patient's Date of Birth	Q7	month, day in two digit fields, year in final four columns, i.e., 01031898=Jan. 3, 1898

Sample Codebook

Central HSA Nursing Home Study: Discharge Data

Column(s)	Variable	Source	Codes
1-5	Patient ID	Assigned	20001-n A unique identification number. The '2' in column one indicates that this is a discharge data record
6-8	Nursing Home ID	Q1	001-n
9	Principal Source of Payment	Q5	1=private pay 2=Medicare (Title XVIII) 3=Medicaid (Title XIX) 4=other public assistance or welfare 5=church support 6=VA contract 7=initial payment-life care 8=no charge 9=other Blank=unknown
10	Patient's Sex	Q6	1=male 2=female 9=unknown
11-18	Patient's Date of Birth	Q7	month, day in two digit fields, year in final four columns, i.e., 01031898=Jan. 3, 1898
19-24	Date of Admission	Q8	day, month and last two digits of year in two column fields, i.e., 010371=Jan. 3, 1971
25-26	Date of Study	Q2	01-31 day of study month
27	Disposition	Q9	1=to home 2=to general hospital 3=to another nursing home 4=to rest home, personal care home or domiciliary care home 5=died 6=to another or unknown place

Chapter 14

A Study of Ambulance Services

I

STUDY METHODOLOGY

A study of ambulance services might be undertaken from a variety of perspectives—surveys of user opinion, surveys of ambulance providers, the use of observers to evaluate the quality of medical care provided by ambulance attendants at the scene of an accident, etc. Although the approach described in this chapter is only one of these, it is considered optimal for serving the objectives of an HSA given the relevant federal regulations and specifications regarding ambulance services, particularly those associated with P.L. 93-154.

The study methodology uses four interrelated components in the collection of the relevant data. The first two components refer to ambulance providers and yield the necessary descriptive data concerning their vehicles, personnel, equipment and the volume and types of services they provide. The third component refers to completed ambulance trips and provides data concerning the nature and frequency of these trips. The final component refers to hospital emergency room visits and provides data concerning the frequency and location of emergencies in the health service area. These four components are referred to as:

- The Provider Profile
- The Provider Data
- The Trip Report Data
- The Emergency Room Data

These four components are designed such that the use of a computer is not required in their implementation, nor in the analysis of the data derived from them (although the data are amenable to coding and subsequent computer analysis). The third and fourth components, however, involve such a large amount of data that the use of a computer may be the only efficient way of handling the information in larger, more urbanized HSAs.

Part 1. The Provider Profile

This first component of the data system serves two functions. It represents a minimal data set that provides general and basic information about the area's ambulance providers, which in the aggregate also describes the area's ambulance system. More important, it represents a complete list of providers that can be utilized as a mailing list and/or sampling frame in subsequent components. A critical part of this second function is that such a list will include at least some data about all providers, including that subgroup who will fail to cooperate in future data collection stages. As a result of this second function and its potential to mitigate the "missing data problem" it is emphasized that the provider profile must be complete and accurate.

A. Definition of Concepts

Three concepts central to this first data component are "ambulance services," "ambulance vehicle," and "ambulance provider."

- Ambulance Services: Ambulance services are considered to include the following:

  a) the emergency transportation of the victims of a "medical emergency" from the scene or location of the medical emergency to an appropriate medical facility. A "medical emergency" is defined in the federal regulations governing P.L. 93-154 as "an unforeseen event affecting an individual in such a manner that a need for immediate medical care (physiological or psychological) is created."[1]

  b) the non-emergency transportation of persons from one location to another, either or both of which is a medical facility; for example, the transfer of a nonambulatory patient from a hospital to a nursing home.

c) the medical care provided by ambulance attendants to the victim of a medical emergency at the scene of the medical emergency and/or in the ambulance while en route to a medical facility.

d) the rescue and/or extrication of a victim of a medical emergency by the ambulance attendants.

- Ambulance Vehicle: Any vehicle which is used for purposes of providing services (a) and/or (b) as described above. For purposes of the study outlined here, emergency (a) and nonemergency (b) transportation are restricted to ground transportation versus air and/or marine transportation. This study does not concern itself with special population ambulance services (e.g., military bases) although some HSAs may wish to include such units.

- Ambulance Provider: For purposes of the provider profile component of the study methodology, an ambulance provider is any individual or organization that provides services (a) and/or (b) as described above. It is not necessary that services (c) or (d) be provided in order to be considered an ambulance provider, and individuals and organizations that exclusively provide services (c) or (d) are not included.

In summary, for purposes of this first data component, the provision of transportation services is essential in order to be considered an ambulance provider.

Another aspect in the definition of ambulance providers, in addition to their functions, pertains to their organizational structure. Definitional difficulties might arise in a situation where a single organization owns and operates several ambulance services in several locations, and perhaps, therefore, represents several providers. This is not the same as the case where an organization maintains vehicle(s) at one or more substations simply for purposes of enhancing response time. In the former case, each of the several services is probably best considered a separate provider, while in the latter case, the substation(s) are simply storage locations for the vehicles of one provider.

While these definitions have been derived with care, it is emphasized that one of the objective's of the provider profile is the collection of data useful in determining who the providers are. Hence, it is important that the initial operating definition should be structured to err on the side of being over inclusive rather than restrictive. Organizations found not to be providers as defined above can be easily struck from the list—those from whom no data are collected are "lost" for analytic purposes. A definition such as "all organizations thought to provide ambulance services in the HSA" is an appropriate starting point. It should be noted that this definition includes organizations based outside the health service area which provide services in the area.

B. Definition of Variables

The following variables make up the provider profile data set:

- service provision: whether or not a given organization provides ambulance service in the HSA. For purposes of this data item "ambulance service" includes emergency and/or non-emergency transportation of patients.
- number of ambulance vehicles by type of vehicle: the number of vehicles operated by the organization. The following response categories should be used:

    conventional ambulance coaches

    station wagons

    hearses or hearse-ambulance combinations

    vans and trucks

    other

- full-time ambulance personnel: the number of employees who work thirty-five or more hours per week and whose work includes being an ambulance attendant and/or driver.

- part-time ambulance personnel: the number of employees with comparable responsibilities who work less than thirty-five hours per week.

- training of ambulance personnel: the number of employees by type of training, according to the following response categories:

  EMT training

  advanced first aid

  basic first aid

  other

- number of ambulance runs by type of run: the total number of ambulance runs made in the past year is to be recorded. The following response categories should be used:

  emergency runs (emergency transportation provided)

  non-emergency runs (non-emergency transportation provided)

  no service runs (e.g., false alarms)

- services: those services, of the following, normally provided:

  emergency transportation

  emergency medical care

  non-emergency transportation

  rescue and extrication

  other (specify)

C. Study Instrument

The recommended instrument to be used for gathering these data is a printed card approximately 4 by 8 inches in size, an example of which is reproduced on the following page. Such a card can easily have all necessary questions printed on both sides.

Ambulance Provider Profile Form

/side one/

PLEASE ANSWER ALL QUESTIONS AS OF (date)

THANK YOU FOR YOUR COOPERATION

1. Do you provide ambulance service (emergency and/or non-emergency transportation of patients) in ______(area)______?

☐ NO (Please return card in post-paid envelope)

☐ YES (Please answer questions 2 through 6)

2. How many ambulance vehicles do you operate (by type of vehicle)?

___ conventional ambulance coaches
___ station wagons
___ hearses or hearse-ambulance combinations
___ vans and trucks
___ other

3. How many ambulance personnel do you employ

___ full-time employees (35 or more hours per week)
___ part-time employees (less than 35 hours per week)

4. What type of training do these personnel have (indicate number in each category)?

___ EMT training
___ advanced first aid
___ basic first aid
___ other

/side two/

5. Please indicate the number of ambulance runs made by your service in the past year (from ____ to ____).

___ emergency runs
___ non-emergency runs (e.g., scheduled transfers)
___ no service or false alarms

Provider ID Code

6. What types of services do you normally provide (check all that apply)?

___ emergency transportation
___ emergency medical care
___ non-emergency transportation
___ rescue and extrication
___ other (specify)____________

____

____

D. Data Collection Design

The units of analysis for this data component are ambulance service providers. However, as indicated previously, the universe of units potentially available for analysis includes all organizations which might be providing ambulance services in the HSA. It is this larger group of potential providers that is the target for data collection—those found to in fact be providers will become the analytic cases. Because the profile data are a fundamental starting point for future data components, they must be complete and accurate. Consideration is therefore not given to the possibility of selecting a sample of providers and gathering data from them. Thus, the data collection design is essentially a standard mailed survey technique. As will be seen, it does include an atypically strong emphasis on follow-up contact to insure a total or near total response rate.

E. Field Procedures

Pretesting

As a general rule, survey instruments such as this should be pretested with a small sample of respondents to insure that the questions are unambiguous and that the responses generally obtained represent useful data. To whatever extent an agency modifies the instrument presented here, a pretest becomes increasingly necessary. Similarly, if local conditions are such that the agency has any reason to doubt the utility of the instrument in its present form, a pretest should be conducted.

If it is determined that a pretest is desirable, the best procedure is to make contact with a small number of geographically proximate providers, explain the situation and ask that they fill out the form. If this test indicates no need for revision these providers need not be contacted again, presuming that the agency is ready to embark upon the complete data collection very shortly after the pretest. If changes in the form are deemed necessary, a further pretest should be conducted, with the number of providers in the test group being a function of the number and magnitude of changes in the form.

Before the actual data collection can begin, a tentative list of providers must be assembled. Various methods of constructing such a list are available, and the utility of the various techniques will depend upon state and local situations. Regardless of the mechanics of putting the list together, it should contain the name, address and telephone number of every organization which is thought to provide ambulance service in the health service area. Once the provider profile has been completed, this working list of organizations will be subsumed as part of the profile. A suggested technique for preliminary list construction is outlined below.

- Construct a tentative list from public record information—e.g., telephone directories/yellow pages. If the state requires licensing of ambulances, the state motor vehicle licensing division will provide a valuable starting point, as will any existing organization of ambulance providers. If any colleges or junior colleges in the area provide EMT training, they may maintain lists of local providers.

- Using the tentative list as a starting point, contact the administrators of several hospitals throughout the area. (For large hospitals the administrator in charge of the emergency department may be a more appropriate contact.) The contact may be by telephone, mail or in person, depending upon the number of ambulance providers on the list. In any event, the hospital administrators should be asked to check the tentative list and add the names of any ambulance service organization of which they know. In some cases this may be a matter of checking hospital records.

- Using the list resulting from the preceeding steps, further checks for omissions can be pursued by contacting local chiefs of police, followed by local fire departments. The utility of adding these steps will have to be determined by the agency. Caution is recommended—as long as there is any reason to believe that the list is not complete subsequent steps should be continued. On the other hand, if by the time of the contact with the fourth or fifth hospital administrator no new names are mentioned, it would not seem useful to continue.

> In any event, at some point in time a decision will have to be made that the list is assumed to be complete. At such time the list of organizations, with addresses, zip codes and telephone numbers should be typed in final form and a numeric code number from 001 to n assigned to each provider. A copy of this list will also serve as the response log described below (see example in Appendix A).

Procedures to Elicit Study Participation

Once given the completed list, the agency will turn to the process of gathering the profile data. As is always the case in survey research, procedures which elicit cooperation from respondents are critical. In the present case the importance is significantly magnified because of two features. First, the data base is to be a census rather than sample and is to serve as a starting point for other data components. Hence, non-response bias must be minimized or preferably eliminated. Second, the agency will be soliciting further cooperation from ambulance providers for future data components. As a result, cooperation in this first step must be obtained in such a way that the potential for further cooperation is not reduced.

Part of this effort to insure cooperation is inherent in the brevity and clarity of the instrument itself; a further reason that modification thereof should be approached with care. The second major mechanism to insure cooperation lies in the care and tact with which the respondents are contacted. In the outline of data collection procedures which follows, it is presumed that the necessary cover letters will be written with great care, on appropriate letterhead stationery, and will not be poorly constructed form letters. An example of a "first contact" letter is included in Appendix A.

One further technique in enhancing potential cooperation is the provision to local media of a brief press release describing the prospective study. This is sometimes useful in adding a dimension of legitimacy to the survey and increases the likelihood that providers will not be surprised or suspicious when contacted. If this is done, the press release should be timed to appear after the listing phase is completed and several days before the profile forms are mailed to providers.

In many HSAs, the provision of ambulance service falls within the jurisdiction of local units of governments, e.g., county boards of supervisors. It may be useful to get their endorsement of the study in order to increase participation by the area's ambulance providers.

Data Collection Procedures

At this time, using the list of providers previously developed, the first letter, and a copy of the provider profile form, should be mailed. Each form should include the identifier code assigned to each organization during the listing phase, but it should have the digit "1" appended, yielding a code in the form XXX1. The "1" signifies that the form is the one provided by first contact. Careful records of the codes assigned to each provider must be maintained for purposes of quality control and because these codes will ultimately provide the capacity to link various data components.

The return of provider profile forms must be monitored with great care. Each returned form should be recorded on the log sheet (see example in Appendix A). It should be checked for completeness and a thank you letter sent out as quickly as possible after the response is received. The thank you letter is of particular importance in this instance, because, as mentioned before, these same providers will in a few weeks be asked to provide much more detailed information through an interview, and the maintenance of a cordial working relationship will enhance response rates during that second round of data collection.

Two weeks after the first mailing, a second letter, including another copy of the profile form, should be mailed to all providers who have not yet responded. The identifier code on this form will be "XXX2", where the "2" signifies that the provider required a second contact. Again, the form of the letter is not critical but it should emphasize the importance of the study and again request cooperation. The agency will, of course, continue to monitor responses and forward thank you letters.

Two weeks subsequent to the second mailing, any remaining non-respondents should be contacted by telephone. An offer to forward another form can be made, but a preference should be stated for simply gathering the necessary data during the telephone conversation. (Forms should at this stage be identified by codes in the form XXX3.) It is acknowledged that a large proportion of those providers who must be contacted a third time will be extremely reluctant respondents, and may well be those who will be most unlikely to cooperate in this, or later data collection activities. It is precisely for this reason that the collection of the profile data is critical; it yields basic data about providers who may well be non-respondents in the future and allows more precise estimates for the entire system. A person who is capable of the necessary mixture of tact and forcefulness should make these telephone contacts. It should be noted that HSAs which are geographically small and where long distance telephone calls would not be prohibitively costly might prefer to use this telephone mode of collection exclusively.

Quality Control

Control over data quality is a critical part of a study of this type and must be an ongoing process. A part of the "quality" of any data set is its completeness, and attempts to insure that all providers respond have been outlined. Another dimension of data quality concerns internal consistency and accuracy. The examination of each returned form by study staff is important in this regard. One further option is available but it is one that has potential pitfalls. It is possible to include a list of the "definitions of variables", (noted above) and explicit instructions as to how the form should be filled out in the letters requesting cooperation. This will in all likelihood improve the consistency of the data. On the other hand, it will increase the time and complexity involved in filling out the form and may, thereby, increase the rate of non-response. In general, the rule governing this option should be as follows:

> If the HSA intends to make considerable use of the substantive data gathered in the profile component, careful definitions and instructions should be included. If (and this is the recommended choice) the HSA views the profile data as essentially a list and intends to draw the majority of the substantive data from other components, the definitions and specifications need not be included.

Further quality control procedures will be implemented in the data processing and storage steps. These will be noted below.

F. Data Processing and Storage

As indicated earlier, this data set is designed in such a way that the storage and analysis thereof can be pursued without a computer. Thus, the baseline storage technique is simply an ordered file of the completed provider/description cards. On the other hand, the information might well be coded and punched onto cards for computer aided analysis. A keypunch operator familiar with such tasks will be able to punch the data directly from the forms, but for most situations the intermediate transfer to code sheets will be necessary. Verification of the keypunching is recommended, and logical edits and range checks should be performed (an example codebook is included in Appendix B).

Part 2. The Provider Data

A. Definition of Concepts

The three general concepts of "ambulance services," "ambulance vehicle" and "ambulance provider" as previously defined for purposes of the provider profile data component will remain in force. However, having completed the profile data component, study staff will be in a position to set forth an operating definition of the concept of provider that excludes those organizations contacted for the profile data which are now known not to operate one or more vehicles which can be considered ambulance vehicles as previously defined. This is not to imply that organizations which operate vehicles used exclusively for rescue and extrication or some other function are not an important part of an EMS system. Rather, we limit the study at hand to the ambulance portion of the total system in order that simplicity and parsimony be maintained, and under the assumption that the major portion of the EMS system can be understood through such an examination.

B. Definition of Variables

In addition to a more detailed analysis of variables defined previously, the provider data component includes the following variables:

- provider name, address, telephone number.
- name of interviewee: this should be the person with direct administrative responsibility over the ambulance vehicles.
- type of organization.
- number of ambulance vehicles (see definition above).
- type, license number, make, year of each ambulance vehicle: "type" of vehicle is a set of nominal categories separating such things as conventional hearse vehicles as well as the various models of fully equipped ambulances.

- emergency transportation: whether or not each vehicle is ever used for emergency transportation.

- radio equipment: for each vehicle, the presence or absence of two-way radio communication equipment, and the extent of any communication network.

- patient compartment measurements: for each vehicle, the width, length and height, in inches of the patient compartment.

- medical equipment: for each vehicle, the presence or absence of 26 medical equipment devices which include the 24 items recommended by the Committee on Trauma.[2]

- rescue and extrication equipment: for each vehicle, the presence or absence of 16 rescue and extrication devices which include the 15 items recommended by the Committee on Trauma.[3]

- number of full-time ambulance personnel (defined previously).

- number of part-time ambulance personnel (defined previously).

- personnel data: the work load, training, refresher training, experience and length of employment of all ambulance personnel.

- runs: the total number of runs made by the provider in the preceeding 12 months, broken down into the numbers of no service, non-emergency and emergency runs, and with the latter broken down further to separate runs requiring rescue and/or extrication.

- hospitals: the name of each hospital to which patients are normally taken and the percent of the total case load taken to each of these hospitals.

- shift information: the number of ambulance personnel on duty and on call during each shift and the number of the former with EMT training.

- back-up agreements: whether or not the provider has explicit agreement(s) with other provider(s) to act as back-up for their services if necessary, or to have them act as back-up for his services if necessary.

- future plans: the presence of plans for expansion or discontinuation of services.

- charges: the type and amount of charges levied for services.

- collection: the rate of collection on these charges.
- service areas. the location of stations and substations, the area normally served by the provider, and the area in which he would provide service if called upon.

It should be noted that the service area data are derived from questions which utilize a map of the HSA's health service area.

C. Study Instrument

The recommended instrument to be used for gathering these data follows.

Central HSA Emergency Medical Services Study

Provider Data Component

Provider Name and Address

Introduction

As you know the Central HSA is conducting a study of Emergency Medical Services in Central. This interview is an important part of that study and your cooperation is appreciated. I want to emphasize that all answers will be held in strictest confidence and no information regarding specific ambulance services will be released for any reason. Only statistical data regarding the complete system will be made public. Do you have any questions before we begin?

Obtain name of interviewee ______________________________

Check accuracy of address above.

Type of organization operating ambulance: (Check One Only)

___Funeral Home	___Fire Department - Voluntary
___Private Commercial Ambulance Firm	___Community Ambulance Service - Voluntary
___Fire Department - Paid	___Hospital Operated
___Police Department	___Other______________________ (Specify)

1. How many ambulance vehicles do you have in operation as of (date)? __________vehicles. (This should be the total number of vehicles.)

2. I would now like some specific information about each of those vehicles.

	Vehicle 1	Vehicle 2	Vehicle 3
Type			
License Number			
Make/Year	/	/	/
Is this vehicle ever used for Emergency Transportation?	___Yes ___No	___Yes ___No	___Yes ___No
Two-Way Radio Equipment and System	Dispatch Police AMB Hospital Fire Dept.	Dispatch Police AMB Hospital Fire Dept.	Dispatch Police AMB Hospital Fire Dept.
Patient Compartment Measurements	width_____" height____" length____"	width_____" height____" length____"	width_____" height____" length____"

Note to Interviewer: The following information regarding equipment is to be collected for each vehicle that is used (however seldom) for emergency transportation. Introduce the question with the statement outlined below. It is emphasized that the "yes" box should be checked if and only if the equipment is routinely and constantly carried in the vehicle. In all other cases, the "no" box must be checked. Write the license number of each vehicle at the head of the column which describes the equipment carried by that vehicle.

3. Now, referring to the (______________) as vehicle 1, the (______________) as vehicle 2, etc., I would like to know whether or not these ambulances carry certain equipment.

   It is quite possible that your vehicles do not carry some of these things, and it may be your practice to maintain equipment not mentioned. For the moment we are concerned specifically with the following material. Let's start with vehicle 1, that is the (______________)........

   Now, regarding vehicle 2, the (______________)....

   Etc.

MEDICAL EQUIPMENT

License Number of Vehicle______________________

Portable Suction Apparatus __Yes __No

Bag-mask Ventilation Unit __Yes __No

Oropharyngeal Airways __Yes __No

Mouth-to-Mouth Ventilation Airways __Yes __No

Portable Oxygen Equipment __Yes __No

Mouth Gags or Tongue Depressors __Yes __No

Sterile Intravenous Fluids __Yes __No

"Universal" Wound Dressings, Approximately 10" X 36" __Yes __No

Sterile Gauze Pads __Yes __No

Triangular Bandages __Yes __No

Aluminum Foil __Yes __No

Adhesive Tape __Yes __No

Sterile Burn Sheets __Yes __No

Traction Splint __Yes __No

Long Padded Splint Boards __Yes __No

Short Padded Splint Boards __Yes __No

Inflatable Splints __Yes __No

Spine Boards, Short and Long, with Accessories __Yes __No

Self Adhering Soft Roller Bandages __Yes __No

Safety Pins __Yes __No

Bandage Scissors __Yes __No

Obstetrical Kit __Yes __No

Blood Pressure Sphygmomanometer and Stethoscope __Yes __No

Poison Kit __Yes __No

Crash Stable Fasteners to Secure Litter in Vehicle __Yes __No

Safety Belts to Secure Patient to Litter __Yes __No

License Number of Vehicle______________________

Portable Suction Apparatus __Yes __No

Bag-mask Ventilation Unit __Yes __No

Oropharyngeal Airways __Yes __No

Mouth-to-Mouth Ventilation Airways __Yes __No

Portable Oxygen Equipment __Yes __No

Mouth Gags or Tongue Depressors __Yes __No

Sterile Intravenous Fluids __Yes __No

"Universal" Wound Dressings, Approximately 10" X 36" __Yes __No

Sterile Gauze Pads __Yes __No

Triangular Bandages __Yes __No

Aluminum Foil __Yes __No

Adhesive Tape __Yes __No

Sterile Burn Sheets __Yes __No

Traction Splint __Yes __No

Long Padded Splint Boards __Yes __No

Short Padded Splint Boards __Yes __No

Inflatable Splints __Yes __No

Spine Boards, Short and Long, with Accessories __Yes __No

Self Adhering Soft Roller Bandages __Yes __No

Safety Pins __Yes __No

Bandage Scissors __Yes __No

Obstetrical Kit __Yes __No

Blood Pressure Sphygmomanometer and Stethoscope __Yes __No

Poison Kit __Yes __No

Crash Stable Fasteners to Secure Litter in Vehicle __Yes __No

Safety Belts to Secure Patient to Litter __Yes __No

4. Similarly, we wish to know whether or not these vehicles routinely carry the following extrication equipment.

Interviewer: Identify vehicles by license number as for Question 3.

License Number of Vehicle______________			License Number of Vehicle______________		
Wrench - Adjustable Jaws	__Yes	__No	Wrench - Adjustable Jaws	__Yes	__No
Screw Driver - Regular	__Yes	__No	Screw Driver - Regular	__Yes	__No
Screw Driver - Phillips	__Yes	__No	Screw Driver - Phillips	__Yes	__No
Hacksaw (twelve blades)	__Yes	__No	Hacksaw (twelve blades)	__Yes	__No
Pliers (vise grip)	__Yes	__No	Pliers (vise grip)	__Yes	__No
Hammer	__Yes	__No	Hammer	__Yes	__No
Fire Axe	__Yes	__No	Fire Axe	__Yes	__No
Wrecking Bar	__Yes	__No	Wrecking Bar	__Yes	__No
Crowbar	__Yes	__No	Crowbar	__Yes	__No
Bolt Cutter	__Yes	__No	Bolt Cutter	__Yes	__No
Double Action Tin Snip	__Yes	__No	Double Action Tin Snip	__Yes	__No
Jack	__Yes	__No	Jack	__Yes	__No
Spreader	__Yes	__No	Spreader	__Yes	__No
Shovel	__Yes	__No	Shovel	__Yes	__No
Manila Ropes	__Yes	__No	Manila Ropes	__Yes	__No
Fire Extinguisher	__Yes	__No	Fire Extinguisher	__Yes	__No

Now I would like some information regarding your ambulance personnel and their training and experience.

5. First of all, how many ambulance personnel do you employ?

___ full-time employees (35 or more hours per week)

___ part-time employees (less than 35 hours per week)

Note to interviewer: If the number of employees is large (e.g., more than 6) you should suggest that the interviewee take a moment to write down a list of their names for his own use. Explain that you do not want the list. Indicate that since you intend to ask several questions about each of the people individually it will greatly reduce confusion if he can check off each name as you proceed through the list. Then gather the data necessary to complete the following table.

6. (Ambulance personnel - training and experience)

	Person 1	Person 2
Work Load	___full-time ___part-time	___full-time ___part-time
Emergency Medical Training	___no training ___informal training on the job ___Red Cross beginners first aid course or equivalent ___Red Cross advanced first aid course or equivalent ___EMT course (81 hours) or equivalent ___advanced EMT course (480 hours) or equivalent ___other training (specify) ______________ ______________ ______________ ______________ ______________	___no training ___informal training on the job ___Red Cross beginners first aid course or equivalent ___Red Cross advanced first aid course or equivalent ___EMT course (81 hours) or equivalent ___advanced EMT course (480 hours) or equivalent ___other training (specify) ______________ ______________ ______________ ______________ ______________
Number of Hours Refresher Training in Past Year	___hours	___hours
Number of Years Emergency Medical Service Experience	___less than 1 year ___no. of years	___less than 1 year ___no. of years
Number of Years with This Organization	___less than 1 year ___no. of years	___less than 1 year ___no. of years

7. (a) How many runs were made by your service in the past 12 months? __________runs.

(b) Of these, how many were

___emergency runs. Of these, how many required rescue and/or extrication?________
___non-emergency runs
___no service or false alarms

8. Concerning the emergency runs, to which hospital(s) do you normally take cases?

______________________(hospital) (percent of total)_______
______________________(hospital) (percent of total)_______
______________________(hospital) (percent of total)_______
______________________(hospital) (percent of total)_______

9. Could you please tell me something about the different shifts?

	Shift 1 (8 AM-4 PM or equivalent)	Shift 2 (4 PM-12 midnight or equivalent)	Shift 3 (12 midnight-8 AM or equivalent)
Number of Ambulance Personnel on Duty	__total __number with basic EMT training	__total __number with basic EMT training	__total __number with basic EMT training
Number of Persons on Call	_______	_______	_______

10. Do you have an explicit agreement with another ambulance service (or services) to act as back-up for them when they cannot respond to calls?

___Yes
___No

Note to Interviewer: if "yes" probe (e.g., "What is the nature of this arrangement?") to insure that it is an explicit arrangement rather than some vague understanding.

11. Do you have similar agreements providing for back-up for your services?

___Yes
___No

12. Do you have any plans for expansion of your service or discontinuation of any part of it over the next six months?

Expansion Plans	Discontinuation Plans
______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

13. Please describe your charging procedures including type and amount.

____

____

____

____

14. What is your rate of collection on these charges?

____

15. Now I would like to determine the area in which you provide service. I have here a map of our area (hand map to respondent) on which we have marked this location with a large X.

(a) Please mark the location of any substations where you maintain one or more ambulances with a small x.

(b) Now, please outline the area where this ambulance service routinely provides emergency transportation (normal service area).

(c) Do you, or would you provide emergency services outside of this area?

Note to Interviewer: If respondent replies "yes" to (c) provide him with a different colored pen and request that he outline the total area in which he would provide emergency service if he were called. If respondent replies negatively to (c) proceed to request copies of his record-keeping forms and then terminate interview.

Thank you again for your cooperation. There is only one thing further that I require. May I please have a blank copy of each form that is used by your service for trip reports and/or billing?

___forms received

___no forms received (why not?)______________________________

D. Data Collection Design

The basic data collection technique for this component is a personal interview survey, consisting of scheduled appointment interviews with each provider of ambulance service in the HSA. The unit of analysis is the provider, as defined above and as identified by the profile component.

It is intended that these data be used for examination of various geographic sub-units in the HSA. As a result, it is extremely unlikely that a procedure of sampling providers would be appropriate. In HSAs where there is little geographic dispersion (e.g., those made up exclusively of an SMSA or part thereof) it might be possible to gather data only from a sample of providers. In such cases, the profile data represent a sampling framework which will allow stratification of the sample on the basis of relevant variables (e.g., size or type of service). It would be entirely possible, using the profile data, to construct a sample which would be highly representative of the total ambulance system. Such a technique would be valuable, however, only to the extent that the HSA is interested exclusively in examining the system as a whole and not its various components. Since such an exclusive interest in aggregate data does not seem likely, the procedures outlined below presume that no sample is selected.

E. Field Procedures

Procedures to Elicit Study Participation

By virtue of having completed the profile data component, the HSA presumably now has some familiarity with the providers of ambulance services in its area, and the providers in turn know of the presence and legitimate research interests of the HSA. As a result, the process of gaining entry for purposes of gathering this second data set is made easier. Further, the experience gained in completing the profile will be useful to the agency in again eliciting cooperation from the providers. For example, a press release or newspaper article briefly describing the results of the profile can be circulated throughout the HSA. Copies might be sent to the providers. Such an article should explicitly note that the data thus far analyzed are exploratory and that further studies are anticipated.

Shortly after this release, a letter should be forwarded to each provider briefly describing the proposed interview. The letter should indicate that the provider will be contacted in the near future to schedule a specific appointment for the interview. The fact that the interview will require only 15 or 20 minutes of the provider's time should be emphasized. An example letter can be found in Appendix A. It might also be useful to send the provider a copy of the questionnaire, due to the fact that certain of the questions will require a search of his/her files in order to obtain the necessary data on the number of annual runs, employee training, etc.

Data Collection Personnel

Following the mailing of these letters, interviewers should be hired and trained for their role in the data collection process. Several sources are available for interviewers. Some agencies may be able to use in-house staff—especially if the number of providers is small. Volunteers might be recruited since the example questionnaire is straightforward and a lack of experience can be compensated for by careful training. The number of interviewers required will depend on the number of providers and the travel time that will be required between interviews. In general, with careful scheduling of appointments to reduce travel time it should be possible for each interviewer to conduct three to four interviews per day. If there are, for example, 200 providers in the HSA, five interviewers (at 15-20 contacts per day) could complete the data collection in two to three weeks. The investment of time and telephone costs to carefully schedule meetings in the same geographic area will more than pay for itself in travel cost and interviewer salary savings.

Regardless of the source of interviewers they must be trained for the specific data collection process at hand. It is recognized that the extent of training required might vary but at least one training session should be held to insure that each interviewer understands the basic concepts and their definitions, knows how he/she should respond to expected questions and is familiar with the interview schedule.

It is suggested that contact be made with a local senior EMT who might be hired as a consultant to assist in the interviewer training. Such an individual will be best able to describe the equipment and be sympathetic with the questions which respondents might have. If agency staff does not include an individual with some experience in survey research, a person familiar with interviewing techniques might also be hired as a consultant. Such people as social science faculty members of local universities or senior employees of private survey research firms will in most cases be pleased to serve such a function.

The instrument presented here has been designed without complex skip patterns or other features which increase the difficulty of an interview. The questions are straightforward and where it seems appropriate, "notes to interviewer" have been inserted. On the other hand, four features of the instrument bear special mention and will merit attention in the training of the interviewers.

- In question 2, data regarding radio equipment are to be gathered. A schematic diagram with the ambulance at its center and four potential contact points around it is presented. The interviewer is expected to draw a connecting line between the ambulance and each contact with which the ambulance has two-way radio communication. No connecting line will be taken to mean a lack of communication capabilities. (Although such an event is unlikely, interviewers should be told to treat mobile telephones as two-way radio communication with all four contact points and insert the connecting lines appropriately.)

- Questions 3, 4 and 6 require that the interviewer keep careful track of vehicles and persons in order to gather relevant data about each. Some practice in handling these questions is appropriate.

- Question 15 requires that the respondent outline his service area on a map provided by the interviewer.
- At the conclusion of the meeting, the interviewer will have to obtain copies of record keeping forms from the provider.

In addition to these four aspects of the interview itself, one further feature of the study is relevant to interviewer training. Confidentiality, and the maintenance of a cordial relationship with respondents are always important parts of an interviewer's job. Since this interview is only one of three data collection procedures, such things are especially significant in this study and should be particularly emphasized in interviewer training. Except for these qualifications interviewer training should be quite straightforward and need only be consistent with generally accepted practice.

Data Collection Procedures

Following this period of interviewer recruiting and training, an appropriate number of persons should be assigned the task of scheduling the interview appointments. Within reason, the convenience of the provider should be the determining factor, but a set time frame for the completion of all interviews should be determined. Providers who were late in responding to the profile data request should be contacted first under the assumption that they may be the most likely to plead a lack of time or inconvenience. Scheduling should be approached with care and attention given to the considerable time savings that can be realized by clustering appointments with providers in geographic sub-areas.

During the scheduling period, interview folders should be made up. One such folder should be prepared, in advance, for each provider. It will contain:

an appointment card, indicating the date, time and place of interview

- a letter certifying and introducing the interviewer
- an instrument.

The instrument will be prepared individually for each package. It will have the provider ID number (as assigned during the profile component) and the provider's name, address and telephone number on the first page. In addition, it will have a number of pages sufficient to cover questions 2, 3, 4 and 6 concerning the number of vehicles and employees in the providing organization. An appropriate number of such pages can be estimated from the profile data plus an extra page to guard against the possibility of recent increases in staff and/or vehicles.

Quality Control

As the interviews are being completed, senior study personnel should maintain certain quality control procedures. Each completed instrument should be checked for its completeness and consistency. Problems should be resolved by telephone contact with the providers. If no such contacts are necessary, a sample of providers should be called and asked about the interview—thus insuring that the interviews actually took place.

F. Data Processing and Storage

A data set of this complexity introduces comparable complexity in its storage and processing. One alternative might be the maintenance of an ordered file containing the completed instruments themselves. Another might be a file of machine-readable data incorporating the complete set of information regarding each provider.

The latter system would present two difficulties. Some of the data (e.g., the service area information) are not codable in a straightforward manner, and because ambulance providers will have varying numbers of vehicles and personnel, data records will be of various lengths. Variable length records require variable format statements for machine reading, and such formats are difficult to implement on most computer systems. These difficulties are by no means insurmountable—for example, the data records might be padded with blank columns to standardize their lengths—and it would be possible to develop a codebook and store these data on cards or tape. Given the problems, however, there is some question as to the value of devoting the necessary resources to such a task.

Part 3. The Trip Report Data

Once having completed the ambulance provider interview, data on actual ambulance trips can be collected. These data will provide the basis upon which ambulance service, (e.g., time lag data, frequency of trips, destination, etc.) can be examined in detail.

A. Definition of Concepts

Two further concepts specific to this part of the study bear definition.

- Ambulance Trip: an ambulance trip is considered to have occurred each time an ambulance vehicle (as previously defined) is dispatched, including self-initiated dispatch. Whether or not service occurs during the run is irrelevant, except that runs whose exclusive purpose is training should be excluded.

- Location of Scene: the specific location at which the ambulance vehicle picked up the patient.

B. Definition of Variables

The following sixteen variables represent the trip report data set.

- provider ID code: the same code utilized in the profile and provider data components.

- date of trip.

- license number of vehicle utilized.

- time of receipt of call: this is the exact time that the ambulance service provider received the request for service. For scheduled runs the term "scheduled" should be inserted after the time. It is possible that the attendants will not, during the run itself, know the time at which the call was received. In these cases, the item should be filled in immediately following the run after ascertaining the time from the person who received the call.

- time of arrival at scene: should be precise and refer to the "scene" as defined above.

- **time of arrival at destination**: refers to the time at which the patient was released from the care of the ambulance crew.

- **training of each attendant**.

- **nature of the call**.

- **provision of rescue and/or extrication**.

- **destination**: whether the destination was a hospital or some other place.

- **hospital**: in cases where the destination was a hospital, the name of the hospital is to be recorded.

- **reason**: in such cases, the reason this particular hospital was selected should be indicated.

- **notification**: whether or not the hospital was provided with advance notification of the arrival of the ambulance.

- **mode of notification**: where notification was provided, the method of notification should be indicated.

- **location**: the specific location of scene.

- **appropriateness of call**: whether or not, in the subjective judgment of the ambulance attendant(s), ambulance services were indicated by the nature of the case.

C. Study Instrument

The recommended instrument to be used for gathering these data follows.

Provide ID Code

Central HSA Emergency Medical Services Study

Trip Report Data Component

This form is to be filled out by one of the ambulance attendants for each trip made from Midnight (Date) through Midnight (Date). Questions 1, 2(a), (b), 3 and 4 should be filled out enroute to the scene. Questions 5 through 10 should be completed enroute from the scene except in cases when patient care precludes doing so. In such cases these questions should be filled out immediately after the patient has been turned over to the hospital's care.

1. Date: ____________________

2. Time of:
(a) receipt of call ____________ a.m., p.m.
(b) arrival at scene ____________ a.m., p.m.
(c) arrival at destination ________ a.m., p.m.

3. License number of ambulance: ______________________________

4. Training of attendants:

Attendant 1

___No emergency medical training
___Informal or on-the-job training
___Beginners Red Cross First Aid Course (or equivalent)
___Advanced Red Cross First Aid Course (or equivalent)
___Basic EMT Course
___Advanced EMT Course
___Other Training (specify)

Attendant 2

___No emergency medical training
___Informal or on-the-job training
___Beginners Red Cross First Aid Course (or equivalent)
___Advanced Red Cross First Aid Course (or equivalent)
___Basic EMT Course
___Advanced EMT Course
___Other Training (specify)

5. Nature of call (check one box only):
___emergency care only
___emergency transportation only
___emergency care and emergency transportation
___non-emergency transportation (e.g., scheduled transfers)
___false alarm or no service

6. Did you provide rescue and/or extrication services on this call?
___yes
___no

7. Destination: ___hospital ---- which hospital? ______________________________
Why this hospital?
___patient request
___nearest
___special care required
___other reason (specify)
___other ______________________________

8. Was hospital notified in advance of your arrival?
___yes ---- How?
___direct radio contact
___indirect radio contact (e.g., by calling dispatch and requesting that the hospital be telephoned)
___other means
___no

9. Location of scene: (Please be as specific as possible) ______________________________
____
____

10. Do you feel that ambulance services were appropriate for this case?
___yes
___no ---- Why not? ______________________________
____

D. Data Collection Design

Before the collection of these data can be implemented, a fundamental decision regarding the basic research design must be reached. Since the unit of analysis for this component is the ambulance trip, the HSA must determine whether to collect primary data, or to abstract data from existing trip records. It will be recalled that blank copies of record forms were obtained from all providers during the interview. Staff should review these forms to ascertain whether or not all providers maintain records which include the data to be collected using the service data instrument. In the unlikely event that all providers maintain adequate records, it may be feasible to have staff personnel collect the required data from these records. This would necessitate a fairly simple reorganization of the trip report data instrument.

It is much more likely that at least a substantial minority of providers will not maintain records that are complete and/or comprehensive enough to utilize this abstracting technique. In this case, HSA staff should institute the primary data collection system outlined below. (It would be possible to mix these two approaches, collecting data directly from some providers and from records from others. This would introduce problems with time. The data from records would have to be collected some time after the data collected in the primary procedure, in order to insure that the two sets of data referred to the same time frames.) Regardless of the approach chosen, it is important that time frames be selected such that a minimum number of trips are included, and the problems of seasonal variation are dealt with. These time frames must be selected before proceeding with the research effort. It is recommended that two one-week periods, one in early spring or late winter, and one in late spring or early summer be selected as data collection periods. This will, in most instances, insure an adequate number of cases, reduce the chances that both periods will be atypical, and introduce some compensation for seasonality.

E. Field Procedures

Pretesting

The question of pretesting again applies. It is suggested that a small number of local ambulance attendants be contacted to conduct an informal pretest of the instrument. It may be that state or local conditions or regulations make this form inappropriate. In such cases, any modifications should again be pretested.

Procedures to Elicit Study Participation

Having set the time periods, and finalized a study instrument, the HSA staff should once again contact the various providers by letter, explaining the nature of this third component and again requesting cooperation. It is to be expected that a number of providers will, by this time, have little patience left for more of these studies. Hence, the letter should note that this is the last data component to be collected and that while it will be instituted twice, it will in fact require only a little time from the ambulance attendants. The letter should specify the periods of intended data collection and indicate that the necessary survey materials will be mailed to the provider a few days in advance of the data collection periods (an example letter can be found in Appendix A). A copy of the instrument might be included.

Data Collection Procedures

About one week before the first time period, the package of data collection material should be mailed. The package should contain:

- an appropriate number of trip report forms, (Such number to be estimated by referring to the provider data and then adding a factor to insure a large enough quantity.) The forms should have the provider ID code written on them.

- a cover letter which includes instructions for collecting the data (in addition to the brief instructions on the form itself).
- the name and phone number of a contact person who might be called (collect) if questions arise.
- a request that the forms be returned in two batches, at the end of each week of data collection.
- two postage paid return mailing envelopes.

Midway through the week after data collection, all organizations which have not returned the forms from the prior week should be contacted to insure that the data had been collected. These procedures will, of course, be repeated for the second data collection time period.

F. Data Processing and Storage

As indicated previously, it is presumed that the trip report data will be of such a volume that computer tabulation is required. As a result, a coding scheme must be developed, and the data coded and punched for storage on some machine readable medium. Card storage is recommended if the agency has difficulty in accessing a computer, because some of the data analysis might be performed with the aid of a counter-sorter.

An almost infinite variety of coding schemes are conceivable and the details of the one selected by a given HSA will have to be determined within the context of its needs. One possible scheme is presented in Appendix B as a suggestion. It has a general feature that may prove particularly useful. That is, the system of encoding the substantive data regarding each trip on one computer card, and the detailed address of the scene on a second card, provides considerable potential convenience for such things as ADMATCH (see Chapter 4 in Section II). Furthermore, this second card can be removed, if necessary, to increase the efficiency of using counter-sort techniques.

These data should be transferred to codesheets before keypunching unless the HSA chooses to pre-code the instrument. The coding process should be directly supervised by a senior staff person to insure accuracy and consistency. Verification of the keypunching is recommended and logical edits and range checks should be performed.

Part 4: The Emergency Room Data

During the interim period between the two rounds of service data collection, plans should be instituted for the implementation of the final data component. These data are to be collected by the completion of a log sheet in the hospital emergency rooms in the HSA and are designed to provide variables necessary to construct indices of met need and service efficiency of the ambulance system. While the data can be collected anytime, there is considerable advantage if the component is instituted for a period which coincides with the two one-week trip report data collection periods. Ideally, two one-week data collection periods simultaneous with the trip date would be preferred. However, the ER data will be more difficult to obtain in the sense that emergency room personnel have a legitimate claim that they do not have time for such efforts. In addition, the ER component may serve as part of the ambulatory care data base (see Chapter 11 in this section), which is a two-week study.

A. Definition of Concepts

Two concepts central to this last data component are operationally defined as follows:

- Hospital Emergency Room: a hospital outpatient care unit for the provision of medical services that are urgently needed to sustain life or prevent critical consequences and that should be performed immediately.[4]

- Emergency: a situation affecting an individual in such a manner that a need for immediate medical care (physiological or psychological) is created. For example, where control of hemorrhage, immobilization, or respiratory care is required immediately to prevent serious impairment or death. This is to be determined by the professional judgment of emergency room personnel.

B. Definition of Variables

This data set is composed of the following seven variables:

- hospital ID code: pre-assigned.
- date.
- shift.
- patient number.
- transportation: the mode of transportation whereby the patient arrived at the emergency room.
- emergency status: whether the patient represents an emergency situation, (previously defined) a non-emergency, or was dead on arrival at the emergency room.
- location: the specific location of the incident which caused the emergency or d.o.a. situation. This variable does not apply to non-emergency cases.*

C. Study Instrument

The recommended instrument to be used for gathering these data follows.

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*Some HSAs may also want to obtain the residential addresses of those cases considered to be "non-emergency." This information may be useful in determining the origin of patients without adequate access to primary care.

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Hospital ID Code

Central HSA Emergency Medical Services Study

Emergency Room Data Component

Date ______________________________

Shift: ________day (8 AM to 4 PM or equivalent)

________evening (4 PM to 12 midnight or equivalent)

________midnight (12 midnight to 8 AM or equivalent)

Patient Number	Mode of Transportation			Emergency Status			Location of Incident
	AMBULANCE	POLICE	OTHER	NON-EMERGENCY	D.O.A.	EMERGENCY	Write in the exact location (i.e., street number, name and zip code, if available for each emergency and d.o.a. case.

etc.

D. Data Collection Design

The design utilized in this component is a census. Data are gathered regarding each emergency room patient during a specified time period. Data are to be collected by the nurse in charge of each hospital emergency room. The unit of analysis is the emergency room visit.

E. Field Procedures

Procedures to Elicit Study Participation

Approximately six weeks before the start of the data collection period the administrator of each hospital which has an emergency room should be contacted by letter. The letter should explain the nature of the study, request the cooperation of the hospital and note the intention of the study staff to work through the nurses who will be in charge of the emergency room during the planned data collection period. It should emphasize that the data collection process will not disrupt normal routine and that only a few data items are required (see example letter in Appendix A). Following the receipt of this letter, personal and/or telephone contact should be made with the administrators to check their intentions regarding cooperation. Cooperation cannot be enforced, but reluctance can often be removed by discussion. It should be noted that some emergency departments may already collect all of the required information. If this is so, the data can be abstracted for the relevant time period.

Data Collection Personnel

During this contact, several details will need to be covered. Arrangements should be made to contact the relevant nurses; perhaps by individual letters, but more likely by way of a memo forwarded through the administrator. In any event, the activity must be explained to them and their cooperation solicited. If it is appropriate, a contact person other than the administrator should be decided upon, as someone will be needed to insure that the forms are completed for the correct time period, that they are collected at the end of each shift and mailed to the HSA at the end of each week. If a different contact is established, he or she should receive the memo to the nurses and be informed as to the nature of the study.

Data Collection Procedures

One week prior to the data collection period a package of survey material should be mailed or delivered to each hospital administrator or a contact person agreed upon after earlier communication. The package should contain:

- an appropriate number of log sheets - where the number is estimated from extant data or through conversations with the administrator. For hospitals in the size range 100-299 beds, the expected number of emergency room visits in 14 days is approximately 500. (These estimates can be easily computed from data available in Hospital Statistics (1974) for hospitals of various size.)[5]
- complete instructions (perhaps as part of the cover letter) regarding who should complete the log sheets, the time frame in which they are to be completed, and suggestions as to the best method of doing so (an example of this letter is included in Appendix A).
- complete instructions, including examples and definitions, as to how the log sheet should be completed (an example is included in Appendix A).
- return mailing envelopes and a request that log sheets be returned at the end of each week.

Quality Control

With the exception of 1) gaining the cooperation of the hospitals and nurses, 2) clear instructions as to the logistics of collecting the data, and 3) instructions for the specific recording thereof, the agency has virtually no control over the completeness or quality of this data set. Post facto checks can reveal problems but there is really no means of rectifying them.

F. Data Processing and Storage

As was the case with the trip report data, it is assumed that volume constraints will necessitate coding and computer analysis of this data set. The log sheet is designed to facilitate direct keypunching, which should, of course, be verified. As few keypunch operators as can complete the task in adequate time should be assigned. Their work should be carefully supervised for the first several cases (an example codebook is provided in Appendix B).

II

DATA ANALYSIS AND USE

Numerous types of graphic representation could be used to display the data from this study, such as tables, histograms, graphs, pie charts, sliding-bar charts, statistical maps, etc. While many of these types would be appropriate, it is recommended that the data from this study be presented in a format which emphasizes tables and frequency distributions. One advantage of this format is that it lends itself to use with or without a computer, expecially if such software packages as SPSS or BMD are used.

Examples of such display of the data from this study are presented in Tables 1, 2 and 3.

Table 1

Ambulance Providers in the Health
Service Area by Type
of Provider

Type	Number	Percent
Funeral Homes	100	50%
Volunteer Fire	40	20%
Commercial Firms	30	15%
Police and Fire	10	5%
Volunteer Non-Fire	10	5%
Hospital Operated	6	3%
Other	4	2%
Total	200	100%

Table 2

Ambulance Vehicles in the Health Service Area by Type of Vehicle

Type	Number	Percent
Conventional Ambulance Coaches	105	35%
Station Wagons	75	25%
Hearses or Hearse-Ambulance Combinations	60	20%
Vans and Trucks	36	12%
Other	24	8%
Total	300	100%

Table 3

Ambulance Personnel in the Health Service Area by Level of Training

Type	Number	Percent
Advanced EMT	8	1%
Basic EMT	149	19%
Advanced First Aid	371	46%
Standard First Aid	240	30%
None	32	4%
Total	800	100%

The data presented in Tables 1, 2 and 3, and all following tables are fictional, but have been derived to reflect expectations of "ball park" situations. They are presented for illustrative purposes only. Also, the particular categories of ambulance providers, vehicles, etc., used in these tables may not be suitable for all health service areas due to the uniqueness of each area's emergency ambulance system.

Table 1 presents data on the number and percent of ambulance providers by type of provider in the health service area, and are obtained from the ambulance provider interview forms. The specific types and percentages of ambulance providers will, of course, vary by HSA. Regardless of the types and percentages of ambulance providers in a health service area,however, it is recommended that the data be arrayed as shown in Table 1, i.e., in descending order of magnitude by type of provider. This format will facilitate ease in interpreting the table. For example, it can be readily seen from Table 1 that the largest number of ambulance providers are funeral homes (100), and that they constitute half (50%) of all ambulance providers in this particular health service area.

Table 2 presents data on the number and percent of ambulance vehicles by type of vehicle in the health service area. The data for this table are also obtained from the provider interview forms. Like the data in Table 1, the data in Table 2 are arrayed in descending order of magnitude by type of vehicle.

Table 3 presents data on the number and percent of ambulance personnel by level of training in the health service area. Unlike Tables 1 and 2, the data in Table 3 are not arrayed in descending order of magnitude by level of training. Instead, the data are arrayed in descending order of importance in terms of the various levels of training. The reason for this is again for purposes of interpretation. It can readily be seen from Table 3, for example, that very few personnel (1%) in this health service area have received the highest level of training, i.e., advanced EMT.

Many variants of the basic display exemplified by Tables 1, 2 and 3 can, of course, be constructed using the data obtained in this study. As will be shown further on in this chapter, these basic tables can also be expanded to include more detailed breakdowns of categories and by smaller geographic areas.

Once having determined the basic model of data display, several approaches to the analysis and use of the data collected in this study are available. The approaches presented in this chapter are not exhaustive of the numerous techniques which can be used in analyzing these data; nor are techniques of data analysis presented for all of the data collected in this study. Those which are presented emphasize the provision of information required by HSAs in their reviews of the proposals of applicants for grants and contracts under the Emergency Medical Services Systems Act of 1973 (P.L. 93-154). That is, the technique of data analysis presented in this section will provide an HSA with information that can be used to:

- describe and evaluate the ambulance system in each region of the HSA,
- estimate the need for ambulance vehicles in each region, and
- assess the met need and service efficiency of the ambulance system.

To simplify the discussion of the various techniques of data analysis which follow, certain assumptions about the emergency ambulance system which exists in Central HSA need to be made. First, it is assumed that ambulance providers provide ambulance services only within the region in which each is located. Second, the residents of each region who use ambulance services use the services of an ambulance provider who is located in that region. Thirdly, it is assumed that the area's hospitals provide emergency room services only to those who reside in Central HSA. Finally, it is assumed that all of the ambulance providers and hospitals agreed to participate in the study, and there are no missing or unknown data. It is unlikely, of course, that such assumptions will in fact be met in "real" study situations. Adjustments to the regional analysis presented below will need to be made to the extent that any of these assumptions are violated.

A. Describing and Evaluating the Ambulance System

To fulfill the data requirements under P.L. 93-641 and the review requirements under P.L. 93-154, HSAs will need data concerning the number and type of ambulance vehicles, the types of ambulance equipment, the number and level of training of ambulance personnel and the utilization of ambulance services.

Ambulance Vehicles and Equipment

Table 2, presented earlier, includes data on the total number of ambulance vehicles by type in Central HSA. According to Table 2, there are 300 ambulance vehicles in Central HSA. However, not all of these 300 ambulance vehicles will be included in the analysis which follows. Those ambulance vehicles which provide only non-emergency transportation are excluded. Only those ambulance vehicles which are used for emergency transportation only, or for both emergency and non-emergency transportation are included in the analysis.

The reason for excluding non-emergency ambulance vehicles is stated in the U.S. Public Health Service's Medical Requirements for Ambulance Design and Equipment, as follows,

> Although ambulances may be used for elective transport of non-ambulatory patients—e.g., hospital to home or nursing home—for outpatient visits, a vehicle used for this purpose that is not designed and equipped to respond to emergency calls should not be termed an ambulance. Unless the vehicle is suitable to both purposes, it should not be permitted to use ambulance-identifying insignia, flashing lights, or warning signal devices.[6]

The analysis of ambulance vehicles in Central HSA, therefore, will include only those vehicles that are used in providing emergency transportation. Also excluded from the analysis of ambulance vehicles are those vehicles which provide only rescue and extrication services.

Under the regulations governing the implementation of P.L. 93-154, ambulance vehicles used for emergency purposes must meet certain federal specifications.[7] One of these federal specifications states that the minimal over-all internal dimensions of the ambulance must be 71 inches in width, 116 inches in length, and 60 inches in height.[8]

Presented in Table 4 are the total number of ambulance vehicles (i.e., those that are used for providing emergency transportation) and the number and percent which meet the minimal size requirements of the patient compartment standard in each region of Central HSA.

In addition to providing basic descriptive information, comparisons can be made between regions based upon the data that are displayed in Table 4. For example, as shown in Table 4, the percentage of vehicles which meet the patient compartment standard varys considerably across regions, from 0% in region F to 67% in region D. Also, it can be seen that the SMSA regions have a higher percentage of vehicles which meet this particular standard than do the non-SMSA regions.

Another of the regulations governing the implementation of P.L. 93-154 pertains to the equipment which are to be carried in each ambulance vehicle. According to the regulations, each ambulance must meet standards relating to medical and rescue and extrication equipment.[9] These standards include the minimum requirements regarding medical and rescue and extrication equipment developed by the Committee on Trauma that were used in designing the provider interview form.[10]

Presented in Table 5 are the number and percent of ambulance vehicles which meet the minimum medical equipment standards by region. In order to meet the medical equipment standards a vehicle must have all

Table 4

Number and Percent
Ambulance Vehicles Which Meet Patient Compartment Standard by Region

Region	Total Vehicles	Vehicles Which Meet Standard	Percent
SMSA	148	80	54%
A	14	8	57%
B	114	60	53%
C	8	4	50%
D	12	8	67%
NON-SMSA	52	20	38%
E	6	2	33%
F	4	0	0%
G	10	4	40%
H	12	5	42%
I	14	6	43%
J	6	3	50%
Total	200	100	50%

Table 5

Number and Percent Ambulance Vehicles Which Meet Minimum Medical Equipment Standards by Region

Region	Total Vehicles	Vehicles Which Meet Standard	Percent
SMSA	148	91	61%
A	14	8	57%
B	114	69	61%
C	8	6	75%
D	12	8	-67%
NON-SMSA	52	29	56%
E	6	1	17%
F	4	0	0%
G	10	6	60%
H	12	8	67%
I	14	10	71%
J	6	4	67%
Total	200	120	60%

of the minimum equipment. Therefore, the vehicles included in Table 5 as those which meet the medical equipment standards are those which carry all of the types of medical equipment indicated on the provider interivew form (i.e., those which had the "yes" response category checked for all types of medical equipment in the provider interview form).

The uses of Table 5 are the same as those for Table 4. The data in Table 5 provide the HSA with basic descriptive and comparative information concerning the extent to which the ambulance vehicles in each region meet the medical equipment standards.

Presented in Table 6 are the number and percent of ambulance vehicles which meet the minimum rescue and extrication equipment standards by region. The requirements for an ambulance to be included among those which meet the minimum rescue and extrication equipment standards are the same as those for an ambulance included in Table 5, i.e., the ambulance must carry all of the types of rescue and extrication equipment indicated on the provider interview form.

In addition to the medical and rescue and extrication equipment, ambulances are also required under the federal regulations to carry two-way radio equipment. It is also recommended that ambulances be able to communicate via two-way radio with the area's hospitals.[11]

Presented in Table 7 are the number and percent of vehicles which carry two-way radios, and the number and percent with two-way radio communication with hospitals in each region.

Table 8 is an overall summary table regarding ambulance vehicles in Central HSA. The data in this table provide information concerning the extent to which the ambulance vehicles in each region meet all of the standards pertaining to patient compartment size, medical equipment, rescue and extrication equipment, and radio equipment (the recommendation that ambulances have two-way radio communication with the area's hospitals is not included as a required standard for

Table 6

Number and Percent Ambulance Vehicles Which Meet Minimum Rescue and Extrication Equipment Standards by Region

Region	Total Vehicles	Vehicles Which Meet Standard	Percent
SMSA	148	41	28%
A	14	3	21%
B	114	33	29%
C	8	2	25%
D	12	3	25%
NON-SMSA	52	9	17%
E	6	1	17%
F	4	1	25%
G	10	2	20%
H	12	2	17%
I	14	2	14%
J	6	1	17%
Total	200	50	25%

Table 7

Number and Percent
Ambulance Vehicles with Two-Way Radio Equipment and Two-Way Communication with Hospitals by Region

Region	Total Vehicles	Vehicles with Two-Way Radios	Per-cent	Vehicles with Two-Way Communication with Hospitals	Per-cent
SMSA	148	75	51%	10	7%
A	14	6	43%	0	0%
B	114	58	51%	8	7%
C	8	4	50%	0	0%
D	12	7	58%	2	17%
NON-SMSA	52	25	48%	0	0%
E	6	2	33%	0	0%
F	4	2	50%	0	0%
G	10	4	40%	0	0%
H	12	8	67%	0	0%
I	14	5	36%	0	0%
J	6	4	67%	0	0%
Total	200	100	50%	10	5%

Table 8

Number and Percent Ambulance Vehicles Which Meet All Standards and Number per 100,000 Population by Region

Region	Total Vehicles	Vehicles Which Meet All Standards	Percent	Standard Vehicles per 100,000 Population
SMSA	148	34	23%	2.2
A	14	2	14%	1.4
B	114	27	24%	2.4
C	8	2	25%	1.8
D	12	3	25%	2.3
NON-SMSA	52	6	12%	1.0
E	6	1	17%	2.0
F	4	0	0%	0.0
G	10	2	20%	1.5
H	12	1	8%	0.8
I	14	2	14%	1.2
J	6	0	0%	0.0
Total	200	40	20%	1.9

purposes of Table 8). Also presented in Table 8 is the rate of "standard" vehicles (i.e., vehicles which meet all of the standards) per 100,000 population in each region.

It is apparent from the data presented in Table 8 which regions in Central HSA should receive priority consideration in the upgrading and development of ambulance resources. Regions F and J have no ambulance vehicles which meet all of the standards.

Ambulance Personnel and Training

The regulations pertaining to the implementation of P.L. 93-154 require that "an emergency medical services system shall include an adequate number of...ambulance personnel with appropriate training and experience."[12] By appropriate training is meant the completion of training at the basic (81 hour) emergency medical technician level.[13]

Earlier in this chapter, in Table 3, data were presented on the number and percent of ambulance personnel by level of training for all of Central HSA. Presented in Table 9 are the number and percent of ambulance personnel with EMT training (basic and advanced) in each region of Central HSA. Also presented in Table 9 is the rate of EMT's per 100,000 population in each region.

In Table 10, the rate of EMTs per 100,000 population is again presented. In this table, however, the data are displayed by ranking ten regions according to the EMT to population ratio. Also presented in Table 10 are the number of personnel in each region who need EMT training in order to bring all of the ambulance personnel in each region up to the basic EMT level. This information is useful in the planning of EMT training programs in Central HSA and in estimating the potential number of personnel that require such training.

Table 9

Number and Percent Ambulance Personnel with EMT Training and Number per 100,000 Population by Region

Region	Total Personnel	Personnel with EMT Training	Percent	EMT's Per 100,000 Population
SMSA	630	125	20%	8.2
A	110	20	18%	14.4
B	380	80	21%	7.0
C	60	15	25%	13.4
D	80	10	13%	7.7
NON-SMSA	170	32	19%	5.3
E	12	2	17%	3.9
F	10	1	10%	1.6
G	38	7	18%	5.2
H	40	8	20%	6.4
I	50	12	24%	7.4
J	20	2	20%	2.8
Total	800	157	20%	7.5

Table 10

Number of Ambulance Personnel Needing EMT Training by Region

Region	EMTs Per 100,000 Population	Personnel Needing EMT Training
F	1.6	9
J	2.8	18
E	3.9	10
G	5.2	31
H	6.4	32
B	7.0	300
I	7.4	38
D	7.7	70
C	13.4	45
A	14.4	90
TOTAL	7.5	643

Another of the regulations regarding ambulance personnel pertains to their continuing education and refresher training. Under the regulations governing the implementation of P.L. 93-154, ambulance personnel are to receive a minimum of 24 hours of refresher training per year.[14]

The data presented in Table 11 provides information concerning the extent to which the ambulance personnel in each region have received the required refresher training. All the data for Tables 9, 10 and 11 were obtained from the provider interview form.

Ambulance Services

HSAs will need data on the number and type of runs which are made by the ambulance providers in their health services area in partial fulfillment of their obligation under P.L. 93-641 to "assemble and analyze data concerning...the patterns of utilization of the area's health resources."

Presented in Table 12 is the average number of total ambulance runs per day and the number and percent of emergency runs per day in each region. Also included in Table 12 is the number of runs per ambulance per day. The data in the first column of Table 12 are obtained by summing the number of runs for each ambulance vehicle in each region during the 14-day study period and dividing by 14. The total number of runs in each region should equal the total number of ambulance trip report forms that were filled out during the 14-day study period. (Remember that only those ambulance vehicles that provide emergency transportation are included; thus, trip report forms for vehicles used exclusively for non-emergency transportation or rescue and extrication are not included in the total number of runs indicated in Table 12.)

The data for the second column of Table 12 are also obtained from the ambulance trip report forms. The figures in this column are the sums

Table 11

Number and Percent of Ambulance Personnel Who Received A Minimum of 24 Hours of Refresher Training During the Past Twelve Months by Region

Region	Total	Number Who Received the Minimum Required Refresher Training	Percent
SMSA	630	320	51%
A	110	48	44%
B	380	202	53%
C	60	40	67%
D	80	30	38%
NON-SMSA	170	80	47%
E	12	5	42%
F	10	3	30%
G	38	18	47%
H	40	20	50%
I	50	29	58%
J	20	5	25%
Total	800	400	50%

Table 12

Average Number of Ambulance Runs/Day by Type and Number of Total Runs/Ambulance/Day by Region

Region	Average Runs/Day			Number of Total Runs/Ambulance/Day
	Total	Emergency	Percent	
SMSA	328	135	41%	2.2
A	38	15	39%	2.7
B	236	98	42%	2.1
C	26	10	38%	3.3
D	28	12	43%	2.3
NON-SMSA	110	40	36%	2.1
E	5	2	40%	0.8
F	6	2	33%	1.5
G	27	10	37%	2.7
H	28	10	36%	2.3
I	33	12	36%	2.4
J	11	4	36%	1.8
Total	438	175	40%	2.2

of all runs in each region in which either emergency medical care and/or emergency transportation were provided during the 14-day study period, divided by 14.

The data for the fourth column of Table 12 are obtained by dividing the total average number of runs per day in each region by the total number of ambulance vehicles (from Table 4) in each region.

Table 12 provides useful information concerning the rate and volume of runs provided in each region. As can be seen from Table 12, the percentage of runs which are emergencies does not vary considerably across regions. The highest percentage, in region D (43%), is a little less than 1/3 greater than the lowest percentage, in region F (33%). However, the rate of total runs per ambulance per day does vary considerably by region. The ambulance vehicles in region C, for example, are used at a rate over four times greater than the ambulance vehicles in region E (3.3 runs per ambulance vehicle per day as compared to 0.8 runs, respectively).

Information pertaining to the volume of runs is important because of the effect of trip volume on the quality and feasibility of ambulance services. It may be the case, for example, that "too few trips will not allow attendants to maintain their skills at a high level of competence, does not allow private operations enough income to cover their costs, and may affect the overall quality of the care provided."[16]

Among the regulations governing the implementation of P.L. 93-154 is the requirement that emergency medical services systems include "sufficient vehicles to respond to 95% of requests for assistance in the emergency medical services system area within not more than 30 minutes."[17]

Presented in Table 13 is the percent of emergency ambulance runs by response time and the average time in minutes of emergency runs from the receipt of the call to the arrival of the ambulance vehicle at

Table 13

Percent Emergency Ambulance Runs by Response Time from Receipt of Call to Arrival of Ambulance at the Scene and Average Response Time per Emergency Run by Region

Region	Less than 15 minutes	15-30 minutes	Over 30 minutes	Average Number of minutes/run
SMSA	60%	38%	2%	10
A	59%	39%	2%	10
B	61%	37%	2%	10
C	55%	38%	3%	11
D	58%	40%	2%	11
NON-SMSA	48%	45%	5%	14
E	43%	50%	7%	15
F	42%	50%	8%	16
G	52%	43%	5%	13
H	53%	43%	4%	14
I	50%	46%	4%	12
J	42%	52%	6%	15
Total	57%	40%	3%	12

the scene in each region. The data for Table 13 are obtained from the ambulance trip report forms.

With the information provided in Table 13, an assessment can be made of the extent to which the ambulance providers in each region are able to respond to emergency calls within the 30 minute requirement in the federal regulations. It can be seen in Table 13, for example, that in three regions (E, F and J), ambulance vehicles arrive on the scene within 30 minutes less than 95% of the time (93% in region E, 92% in region F and 94% in region J).

Another of the criteria which can be used to evaluate the emergency ambulance system in Central HSA is the extent to which hospitals are notified in advance of incoming emergencies. Presented in Table 14 are the number and percent of emergency ambulance runs in which the hospital was notified in advance in each region. The data for Table 14 were obtained from ambulance trip report forms.

As shown in Table 14, the percentage of emergency runs in which the hospital was notified in advance of the impending arrival of the ambulance is consistently lower in the more rural, non-SMSA regions of Central HSA. In one of the non-SMSA regions, region F, the hospital was notified in advance in only half of all the emergency runs. It is especially important that in rural areas, where hospitals often do not maintain a fully staffed emergency room on a 24 hour basis, advance notification be given to the hospitals of incoming emergencies. "In rural areas a patient may be sped to a hospital in 20 minutes and then wait 40 minutes for the arrival of appropriate personnel."[18]

Another of the regulations governing the implementation of P.L. 93-154 states that the emergency medical services system shall "provide for the establishment of appropriate arrangements with emergency medical services systems or similar entities serving neighboring areas for the provision of emergency medical services on a reciprocal basis where access to such services would be more appropriate and effective in terms of the services available, time and distance."[19] It is

Table 14

Number and Percent of Emergency Ambulance Runs by Notification of Hospital in Advance by Region

Region	Total	Notification of Hospital in Advance	Percent
SMSA	3,780	2,744	73%
A	420	310	74%
B	2,744	1,993	73%
C	280	205	73%
D	336	236	70%
NON-SMSA	1,120	686	61%
E	56	30	54%
F	56	28	50%
G	280	182	65%
H	280	170	61%
I	336	215	65%
J	112	61	54%
Total	4,900	3,430	70%

particularly important that plans exist for providing and receiving back-up emergency ambulance services across regions during mass casualties and natural disasters.

Information with which to evaluate the extent to which plans for back-up services exist among each region's ambulance providers is provided in Table 15. The data for Table 15 are derived from the provider interview form. The data for column two of Table 15 include those providers with agreements with neighboring regions to either provide and/or receive back-up services.

Yet another of the many criteria which can be used to evaluate the emergency ambulance services in Central HSA is the number and training of attendants on each ambulance during emergency runs. According to the regulations, ambulance vehicles during emergency runs "shall include during patient transport at least two attendants trained to the basic emergency medical technician level."[20]

Presented in Table 16 are the number and percent of emergency ambulance runs in each region where there were two EMTs on board the ambulance. The data for Table 16 provide information which is useful in evaluating the quality of care provided during the transportation of patients, assuming that patients will receive better quality of care from attendants with EMT training as compared to attendants with less than EMT training.

Table 17 is an overall summary table of the emergency ambulance runs in each region of Central HSA. In this table, data are presented on the number and percent of emergency ambulance runs which were made during the 14-day study period in each region and which satisfied certain of the aforementioned standards. These standards are as follows:

- the ambulance vehicle used to transport the patient was a "standard" ambulance vehicle (Table 8)

Table 15

Number and Percent of Ambulance Providers with Back-up Service Arrangements with Other Providers by Region

	Ambulance Providers		
Region	Total	Providers with Back-up Service Arrangements	Percent
SMSA	130	58	45%
A	12	4	33%
B	100	42	42%
C	7	5	71%
D	11	7	64%
NON-SMSA	50	14	28%
E	5	0	0%
F	5	0	0%
G	10	3	30%
H	10	2	20%
I	14	7	50%
J	6	1	17%
Total	180	72	40%

Table 16

Number and Percent of Emergency Ambulance Runs with Two EMTs/Ambulance by Region

	Emergency Ambulance Runs		
Region	Total Number	Number With Two EMTs	Percent
SMSA	3,780	715	19%
A	420	77	18%
B	2,744	525	19%
C	280	56	20%
D	336	57	17%
NON-SMSA	1,120	167	15%
E	56	0	0%
F	56	0	0%
G	280	53	19%
H	280	54	19%
I	336	60	18%
J	112	0	0%
Total	4,900	882	18%

Table 17

Number and Percent Emergency Ambulance Runs Which Met All Standards

Region	Emergency Ambulance Runs		
	Total	Runs Which Met All Standards	Percent
J	112	0	0%
F	56	0	0%
E	56	0	0%
I	336	54	16%
D	336	55	16%
A	420	70	17%
H	280	49	18%
B	2,744	495	18%
C	280	50	18%
G	280	52	19%
NON-SMSA	1,120	153	14%
SMSA	3,780	672	18%
Total	4,900	825	17%

- the ambulance arrived at the scene within 30 minutes from receipt of the call (Table 13)
- the hospital was notified in advance of the arrival of the ambulance at the hospital (Table 14)
- at least two ambulance personnel with a minimum of basic EMT training were on board the ambulance vehicle (Table 16)

Table 17 provides information which is useful in assessing the appropriateness of the emergency ambulance services provided in Central HSA. As can be seen in Table 17 (which ranks the regions according to the percentage of emergency runs made according to federal standards), the percentage of appropriately transported patients is very low throughout Central HSA. For Central HSA as a whole, less than one patient in five was transported under the conditions set forth in the federal regulations. Furthermore, in three of the ten regions in Central HSA, none of the patients were appropriately transported.

It should be noted that the assessment of the appropriateness of emergency ambulance services based upon the information in Table 17 is only an assessment of appropriateness from the standpoint of whether or not the patient was transported in an appropriately staffed and equipped emergency ambulance vehicle. Not taken into consideration is whether or not the patient needed to be transported in the ambulance in the first place. Also ignored in this assessment are the persons who required emergency ambulance services but who did not receive them. Techniques for assessing these factors are discussed later in this chapter.

B. Estimating the Need for Ambulance Vehicles

As stated in the regulations governing the implementation of the Emergency Medical Services Systems Act of 1973 (P.L. 93-154), "an emergency medical services system shall...include an adequate number of necessary ground, air and water vehicles and other transportation facilities to meet the individual characteristics of the system's service area."[21]

Suggested below is a methodology which uses the data collected in this study for estimating the need for ground vehicles. This methodology is based upon certain features of the normal curve.*

The methodology of estimating the need for emergency ambulance vehicles consists of three parts: 1) estimating the number of incidents to which an emergency ambulance system must be able to respond,which occur per day within each county; 2) estimating the number of vehicles which would be required to respond to the estimated number of incidents; and 3) comparing the number of vehicles required with the number currently available.

Part 1. Estimating the Number of Incidents

It should be clear that there will be considerable variation in the number of incidents per day which result in a need for emergency ambulance service. On some days there may be very few such occurrances, while on others there may be a very large number. As a result, the agency must examine the distribution of ambulance-requiring incidents.

Using the data collected in the emergency room data component, two statistics can be calculated for each region. These are the mean number of incidents per day, and the standard deviation about that mean.

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*Most basic statistics textbooks will contain a discussion of the properties of the normal curve and its applications in social science research. One source, for example, is R. J. Senter, Analysis of Data: Introductory Statistics for the Behavioral Sciences. Scott, Foresman and Co., Atlanta, 1969, Chapters VII and VIII.

Note that the mean is based on all patients requiring emergency ambulance services regardless of mode of transportation to the emergency room and not just those patients who needed ambulance services and received them. In other words, the number to be used in calculating the mean should include those patients who came to the emergency room as a result of an incident occurring in a given county, and who, in the judgment of the emergency room staff, should have received ambulance services (regardless of whether or not such services were received). These numbers, therefore, are the sums of the cases on the hospital emergency room log sheet with a check in columns 6 and 7, (i.e., "emergency" and "d.o.a."), by county of location of the incident, for each day during the 14-day study period. The counties will be aggregated to regions as appropriate.

The total number of such incidents for each of the three 8-hour shifts during a single 24-hour day will need to be summed before they can be used. If more detail is desired, the number of incidents requiring emergency ambulance services could be listed by shift instead of by day. An analysis on the basis of 8-hour shifts instead of 24-hour days would be useful in determining the varying demands made upon the emergency ambulance system during different shifts. The days of the week could also be identified, thus permitting an analysis of the varying demand made on the system during weekends as compared to weekdays. Both of these added dimensions, i.e., a breakdown by shift and by day of the week, could be important in the final determination of the number of emergency ambulance vehicles to be manned and available for providing services during different periods of the day and week. In order to simplify the illustrations included in this chapter, however, the data are aggregated by 24-hour days without regard for the day of the week.

For purposes of discussion, let us assume that the number of incidents which, according to the emergency room staffs of the hospitals in the service area, required emergency ambulance services in county #1 during the 24-hour period of the first day of the study was 23. The following day it was 15, the following day 24, etc., and that the total number of incidents that required emergency ambulance services in county #1 during the 14-day study period was 304 (see Figure 1 below).

Figure 1

Incidents Requiring Emergency Ambulance Services
by Region per Day

Region	County	Day														Total Incidents
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
A	#1	23	15	24	20	22	30	22	21	20	17	21	22	24	23	304

Similar figures would, of course, be calculated for each of the remaining 29 counties in this particular HSA. It should be noted that for regions constituting more than one county, the total incidents equals the sum of the total number of incidents for each of the counties contained within that region. The mean number of incidents in region A (which is made up exclusively of county #1) is, therefore, 304 ÷ 14 or 21.7 incidents.

The standard deviations of these distributions are then calculated, providing a measure of the dispersion, or spread around the mean. The formula for standard deviation is:

$$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}}$$

where,

x = the individual score (number of incidents that day)

$\bar{x}$ = the mean

$n = 14$

Both of these statistics can be calculated in a variety of ways. Computer programs specifically designed for these data can be written or existing software packages like BMD or SPSS can be used. The latter includes convenient ways to select the appropriate cases and is particularly easy to use. The statistics might be calculated by hand (an example of how to do so is presented in Appendix C) but the numbers of cases involved makes this last option rather cumbersome. In any event, once given the mean and standard deviation for each region the agency is ready to proceed.

It is clear that no ambulance system can be simultaneously cost-efficient and responsive to every incident. That is, the presence of variation in the number of incidents per day implies that if there are ambulances sufficient to respond to days of highest incidence, many of them would be idle on days of low incidence. Similarly, a system which has ambulances sufficient to respond to the average number of daily incidents would, on frequent occasions, be unable to discharge its responsibilities adequately. As a result, some number of incidences which can be reasonably planned for must be set forth. While this is in some ways an arbitrary decision, it is influenced by such other factors as the extent and sophistication of system back-up. For purposes of exemplification, we have chosen the level of 95%. That is, we wish to plan in terms of an "expected" number of incidents per day such that the actual number of incidents will be equal to or less than this "expected" number on 95% of the days.

Assuming that the data referring to the selected 14-day period are distributed normally about the mean and are representative of the year, this figure can be estimated from the emergency room data as follows:

$$E = M_i + S_i\ (1.645)$$

where,

E = the "expected" number of incidents

M_i = the mean number of incidents per day

S_i = the standard deviation

1.645 = a constant reflecting that area in a normal distribution representing 95% of the cases.*

This figure will, of course, be calculated separately for each region.

In the example discussed above, the resulting estimate would be 27 incidents, which is derived as follows:

$$21.7 + 3.4(1.645) = 27.3$$

Hence, it can be expected that in this region, 27 or fewer incidents will occur on 95% of the days. Obviously, more than 27 incidents will occur on the remaining 5% of days, (i.e., about 18 days per year). On such days, it is assumed that back-up arrangements can provide the required additional vehicles. Further, on the many days when the supply of ambulance vehicles exceeds need, the ambulance vehicles might well be utilized for non-emergency transportation.

It bears re-emphasis that the selection of 95% level is arbitrary. Some HSAs may wish to plan for a system capable of meeting the need for ambulance service more than 95% of the time, while others (particularly those with well organized inter-regional back-up plans) may choose to plan for a system capable of meeting needs less than 95% of the time. In order to adjust the percentages of time in which the maximum number of incidents will equal or exceed the number requiring emergency ambulance services, the constant used in the calculation, i.e., 1.645, will need to be changed. The appropriate factor to use in place of 1.645 which corresponds to the desired maximum level of need (for example, 90%, 80%, 75%, etc.) can be found in a table which lists the areas under the normal curve. Such a table can be found in most statistics textbooks.

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*90% of the area under a normal curve is included at ± 1.645 standard deviations from the mean. Because only the maximum number of incidents is desired, however, interest is centered only on the right side of the curve. At 1.645 standard deviations from the mean, only 5% of the area right of the curve is excluded; thus, it is expected that in 95% of the cases the maximum number of incidents won't exceed the figure located at + 1.645 standard deviations from the mean.

Part 2. Estimating the Number of Required Vehicles

Using Worksheet A, enter the number of "expected" incidents in each region under column (1). The figures under column (1) are obtained from the calculations described above.

The figures in column (2) of Worksheet A represent the planned number of emergency runs which each ambulance vehicle is expected to make during a 24-hour day in each region. Four emergency runs per ambulance per day were selected for regions exceeding 100,000 population. Three runs per ambulance per day were selected for regions with populations under 100,000.

Each HSA will need to decide which number(s) of emergency runs per ambulance per day is to be selected in each region for purposes of column (2). The numbers 4 and 3 appearing in column (2) are believed to be reasonable estimates of what an emergency ambulance system can be expected to provide in order to maximize efficiency while minimizing the need for back-up services. It should be noted that the larger the number selected for column (2), the smaller will be the number of required ambulance vehicles, and vice versa.

The figures in column (3) are obtained by dividing the daily maximum expected incidents in each region (column 1) by the planned number of emergency runs per ambulance per day (column 2). The figures in column 3, therefore, represent the number of standard ambulance vehicles which are required in each region to respond to the expected need for emergency ambulance services.

Worksheet A

Calculation of Number of Required Standard Ambulances by Region

Region	Maximum Expected Incidents	Runs/ Ambulance	Number of Standard Ambulances Required (1)÷(2)
	(1)	(2)	(3)
A	27	4	7
B	194	4	49
C	20	4	5
D	23	4	6
E	6	3	2
F	6	3	2
G	23	4	6
H	21	4	5
I	28	4	7
J	8	3	3
Total	356	-	92

Part 3. Comparing the Number of Required Vehicles to Current Supply

Presented in Table 18 are the number of standard ambulance vehicles required and the number available in each region. Also presented in Table 18 is the ratio of available vehicles to needed vehicles. This supply/need ratio is used to rank the ten regions in Central HSA. Table 18 also presents information on the number of additional standard ambulance vehicles which are required in each region.

In Table 18, the number of standard ambulances required is derived from column (3) of Worksheet A. The number of available standard ambulances is derived from Table 8. The supply/need ratio is obtained by dividing the number of available standard ambulances in each region by the number of standard ambulances required.

Table 18 provides important information which can be used in the decision making process of HSAs regarding the development of health resources in their health service areas. With the information provided in Table 18, for example, it can be readily determined which of the ten regions in Central HSA deserves priority consideration concerning the upgrading and development of ambulance vehicles, namely, regions J and F. Furthermore, it can be determined precisely how many additional standard ambulance vehicles in these two regions will be required in order to meet the anticipated need, namely, 3 in region J and 2 in region F.

It should be noted that the number of additional standard ambulances required in each region as indicated in Table 18 does not necessarily mean the number of new vehicles that need to be purchased for each region (although in some regions this may in fact be the case). It is likely that some of the non-standard ambulance vehicles in each region can be brought up to the level of a standard vehicle by adding certain required medical, rescue and extrication and/or two-way radio equipment. In other words, HSA staff should examine the possibility of upgrading present ambulance vehicles in lieu of purchasing new ones.

Table 18

Number of Standard Ambulances Required and the Number Available by Region

Region	Number of Standard Ambulances Required	Number of Available Standard Ambulances	Supply/ Need Ratio	Number of Additional Standard Ambulances Required
J	3	0	.00	3
F	2	0	.00	2
H	5	1	.20	4
A	7	2	.29	5
I	7	2	.29	5
G	6	2	.33	4
C	5	2	.40	3
D	6	3	.50	3
E	2	1	.50	1
B	49	27	.55	22
Total	92	40	.44	52

C. Assessing the Met Need and Service Efficiency of the Emergency Ambulance System

Public Law 93-641 states that "each health systems agency shall have as its primary responsibility the provision of effective planning for its health service area of health services, manpower and facilities which meet identified needs, [and] reduce documented inefficiencies,..."[22] In order to fulfill their primary responsibility pertaining to the emergency ambulance services that are provided in their health service areas, HSAs will need to determine 1) the extent to which identified needs for emergency ambulance services are being met and 2) the extent to which unnecessary ambulance services are being provided.

It is possible to assess the extent of 1) and 2) above with the data from the hospital emergency room log sheet. Presented in Table 19 are data obtained from the emergency room log sheets which compare the need for ambulance services and the actual receipt of these services by the patients who utilized the emergency rooms in Central HSA during the 14-day study period. Table 19 shows, for example, that a total of 2,450 persons received emergency ambulance services; and of this number, the emergency room staff judged that 2,082 actually needed the services and 368 did not. The same table also shows that a total of 21,197 persons utilized hospital emergency rooms but did not receive emergency ambulance services; and of these, 3,107 were judged to have needed the services.

The Index of Met Need

The data presented in Table 19 can be used in the construction of indices to measure 1) the extent to which identified needs for emergency ambulance services are being met, and 2) the extent to which unnecessary ambulance services are being provided. The first index, the index of met need, was introduced by Gibson in his article on "Evaluative Criteria for Emergency Ambulance Systems."[23] Gibson refers to this index of met need as the "Ambulance Sensitivity Index."

Table 19

Comparison of the Need for, and Actual Receipt of, Ambulance Services

Received Ambulance Service	Needed Ambulance Service		
	Yes	No	Total
Yes	(A) 2,082	(B) 368	2,450
No	(C) 3,107	(D) 18,090	21,197
Total	5,189	18,458	23,647

It is defined as "the proportion of those patients needing ambulance service who received it."[24]

Referring to Table 19, the index of met need is calculated as follows:

$$\text{index of met need} = \frac{\text{cell (A)}}{\text{cells (A)+(C)}} = \frac{2{,}082}{5{,}189} = .40$$

The index of met need for Central HSA is .40. Interpreted as a percentage, the index of met need indicates that 40% of the persons who required emergency ambulance services in Central HSA received such services.

Ideally, the index of met need should equal 1.00, which would mean that all those persons judged to have needed emergency ambulance services received them. For this to be the case, cell (C) in Table 19 would have to be zero.

The data in cells (A) and (C) of Table 19 can also be used to construct an index of unmet need. The index of unmet need is calculated as follows:

$$\text{index of unmet need} = \frac{\text{cell (C)}}{\text{cells (A)+(C)}} = \frac{3{,}107}{5{,}189} = .60$$

This index is interpreted as the proportion of patients who required emergency ambulance services but did not receive them. The index of unmet need is simply the converse of the index of met need, (i.e., 1.00 minus the index of met need equals the index of unmet need). Both the indices of met and unmet need can be used to assess the extent to which identified needs for emergency ambulance services are being met.

It should be noted in reference to the index of met need that the appropriateness of the ambulance services provided to persons indicated in cell (A), i.e., whether or not the person was transported in a standard ambulance vehicle containing adequate equipment and manned by two EMTs, is not taken into consideration. A procedure for assessing the extent to which patients were transported under appropriate conditions was discussed earlier (see Table 17).

The Index of Service Efficiency

The index of service efficiency is defined as the proportion of those patients who received emergency ambulance service and needed it. Referring to Table 19, the index of service efficiency is calculated as follows:

$$\text{index of service efficiency} = \frac{\text{cell (A)}}{\text{cells (A)+(B)}} = \frac{2{,}082}{2{,}450} = .85$$

The index of service efficiency for Central HSA is .85. Interpreted as a percentage, the index of service efficiency indicates that 85% of the persons who received emergency ambulance services in Central HSA needed such services.

Similar to the index of met need, the index of service efficiency should equal 1.00 in an ideal system. This would mean that all of the patients who received emergency ambulance services needed them.

A counterpart to the index of unmet need, is the index of service inefficiency. This index equals 1.00 minus the index of service efficiency (in this case, .15), and represents the proportion of those patients who received emergency ambulance services but didn't need them. Both the indices of service efficiency and inefficiency can be used to assess the extent to which unnecessary ambulance services are being provided.

Tables similar to Table 19 can be constructed for each of the ten regions in Central HSA. The indices of met need and service efficiency can then be calculated. Table 20 contains the index of met need and Table 21 contains the index of service efficiency for each region in

Table 20

Index of Met Need by Region

Region	Index of Met Need
F	.25
J	.29
E	.29
I	.32
D	.33
H	.35
A	.38
C	.43
B	.46
G	.47
SMSA	.45
NON-SMSA	.35
Total	.40

Table 21

Index of Service Efficiency by Region

Region	Index of Service Efficiency
F	.65
E	.67
J	.71
D	.71
H	.75
I	.76
B	.85
A	.88
G	.88
C	.90
SMSA	.87
NON-SMSA	.78
Total	.85

Central HSA. The information provided by these tables will be useful in the decision-making process of HSAs regarding the planning, development and review of emergency ambulance services.

Appendix A

Material Related to Data Collection:

- Example Provider List and Response Log
- Example First Letter to Ambulance Providers
- Example First Letter Regarding Ambulance Provider Data
- Example First Letter Regarding Trip Report Data
- Example First Letter to Hospital Administrators
- Example Cover Letter to Accompancy Emergency Room Survey Materials
- Instructions for Completion of the Emergency Room Patient Log Sheet

Example Provider List and Response Log

Code	Provider	Profile Complete	Number of Contacts Required
001	Name Address Telephone	(date)	
002	⋮	⋮	
003			
004			
005			
006			
007			
008			

etc.

Example First Letter to Ambulance Providers

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Dear

As you might know, the Central Health Systems Agency is charged with various responsibilities to study health services in this area. In meeting part of these responsibilities, we are now initiating a study of the emergency medical services system. All ambulance service providers, being a fundamental part of that system, are being surveyed in order that we may learn more about emergency medical services in our area. Attached to this letter you will note a card containing several brief questions. Please take a moment to fill out and return this card in the enclosed postage paid envelope; it is very brief and should take only a little of your time. I should note that this information will be treated confidentially and only statistical information regarding the system as a whole will be released. No individual providers will be identified.

Thank you for your cooperation. If you have any questions about this study or any other activities of the Central Health Systems Agency, please do not hesitate to call me.

Yours truly,

Example First Letter Regarding Ambulance Provider Data

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Dear:

A few weeks ago we contacted you with a request for some information about your ambulance service. You were kind enough to respond and your efforts were appreciated.

We are now embarking on a second phase of that study. In this instance, we intend to gather more detailed information regarding the vehicles, equipment and personnel which make up the EMS system in Central. To do this, we must conduct a brief interview with each provider in the area. The interviewer should take only 15-20 minutes.

Sometime over the next few days we will contact you by telephone in order to make an appointment at some mutually convenient time to conduct the interview. I hope we can again count on your cooperation.

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Example First Letter Regarding Trip Report Data

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Dear:

We have been very pleased with the cooperation received by you and other ambulance providers in our ongoing study of the local emergency medical services system. There remains only one further step in the completion of this study, and it is hoped that we can again count on your assistance.

In this last component of our study, we must gather information about the actual runs made by ambulances in our area. To do this, we request that ambulance attendants fill out a very brief form for each run over a specified time period. An example of this form is attached. There will be two such time periods of data collection, one in the early part of next month and the second will be late in June.

A few days prior to the start of each data collection period we will forward a package containing an appropriate number of forms and detailed instructions as to their completion. It is hoped that you will emphasize the importance of this activity to your attendants.

Thank you again for your assistance.

Yours truly,

Example First Letter to
Hospital Administrators

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Dear:

As part of our responsibilities to study health services in this area we have, over recent weeks, been examining the emergency medical services system. Our emphasis until now has been on the ambulance service component of that system.

At this point, we must turn our attention to the hospital emergency room. We hope to collect a very small amount of data about visits to the hospital emergency rooms in this area, and hope that we can count on the cooperation of (hospital).

It has been the experience of researchers in this field that the necessary data can best be collected in the emergency room by the nurse in charge. Data collection involves only a few seconds of time per case and is not disruptive of routine. A copy of the proposed data collection instrument is attached.

I will be in touch with you by telephone over the next few days to discuss this matter with you.

Yours truly,

Example Cover Letter to Accompany Emergency Room Survey Materials

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Dear

We are forwarding herewith the materials necessary to implement the emergency department survey which we have discussed with you over the past few weeks. Enclosures include:

- sufficient copies of the data collection forms
- copies of instruction sheets regarding the data collection
- two postage paid envelopes for use in returning the completed forms.

It is recommended that one copy of the instructions be posted on the staff bulletin board in the emergency department, and that the senior nurse for each shift beginning at midnight (date) and ending at midnight (date) be given a copy. The data collection forms should be stored in the emergency room where they may be easily accessed by the staff of each shift. The mailing envelopes should also be kept in the emergency room (preferably at the main desk) at a depository where completed forms can be placed at the end of each shift. Please return the forms collected during the first week as quickly as possible following the evening shift on (date).

Your cooperation in this effort is sincerely appreciated. If you have any questions please do not hesitate to call me (collect) at (number). Thank you for your assistance.

Yours truly,

Instructions for Completion of the Emergency Room Patient Log Sheet

1. At the beginning of your shift, write in the date and check the appropriate shift.

2. Several patient numbers can be listed in advance to save time.

For Each Patient:

3. Check the appropriate box under "Mode of Transportation".

4. Check the appropriate box under "Emergency Status" using the following guidelines:

   (a) DOA: Obvious

   (b) Emergency: A situation affecting an individual in such a manner that a need for immediate medical care (physiological or psychological) is created. For example, where control of hemorrhage, immobilization, or respiratory care is required immediately to prevent serious impairment or death.

   (c) Non-emergency: All other cases

5. Write in the specific location of the incident causing the emergency or d.o.a. Indicate under the location of the incident the exact address at which it occurred. This applies only if "emergency" or "d.o.a." are checked in the preceeding column.

6. At the end of your shift place the completed log sheets in the envelope provided for that purpose. The nurse on duty during the evening shift on (date) and (date) should close the envelopes and deliver them to the hospital administrator.

Appendix B

Material Related to Data Processing:

- Example Codebook - Provider Profile Data
- Example Codebook - Trip Report Data
- Example Codebook - Emergency Room Data

Example Codebook-Provider Profile Data

Column(s)	Variable	Source	Codes
1-3	Provider ID	ID code	001-n
4	Response	ID code	1=first request 2=second request 3=third request
5-6	Number conventional ambulance coaches	Q 2	code actual number 99=data missing
7-8	Number of station wagons	Q 2	code actual number 99=data missing
9-10	Number of hearse or hearse-ambulance combinations	Q 2	code actual number 99=data missing
11-12	Number of vans and trucks	Q 2	code actual number 99=data missing
13-14	Number of other vehicles	Q 2	code actual number 99=data missing
15-16	Number full-time employees	Q 3	code actual number 99=data missing
17-18	Number of part-time employees	Q 3	code actual number 99=data missing
19-20	Number of employees with EMT training	Q 4	code actual number 99=data missing
21-22	Number of employees with advanced first aid	Q 4	code actual number 99=data missing
23-24	Number of employees with basic first aid	Q 4	code actual number 99=data missing
25-26	Number of employees with other training	Q 4	code actual number 99=data missing

Column(s)	Variable	Source	Codes
27-29	Number of emergency runs last year	Q 5	code actual number 999=data missing
30-32	Number of non-emergency runs last year	Q 5	code actual number 999=data missing
33-35	Number of no-service runs last year	Q 5	code actual number 999=data missing
36	Emergency transportation	Q 6	1=yes 2=no
37	Emergency medical care	Q 6	1=yes 2=no
38	Non-emergency transportation	Q 6	1=yes 2=no
39	Rescue and extrication	Q 6	1=yes 2=no
40	Other services	Q 6	1=yes 2=no
41-42	County code	address	provide a code for each county in the HSA

Note: more specific address information (perhaps the complete mailing address) can be encoded if desired. This might be particularly useful to HSAs which have a large number of providers, in that it provides the potential for computer generated mailing labels, mapping etc.

Example Codebook - Trip Report Data

Card 1

Column(s)	Variable	Source	Codes
1-3	Provider ID	-	same as for previous components
4-5	Date	Q.1	01-31 day of month 99 = data missing
6	Data period	-	1 = first data period 2 = second data period 9 = data missing
7-11	Trip ID	Assigned	00001-n
12-18	Vehicle license number	Q.3	right justify the actual number, including any alphabetic symbols. 9999999 = data missing
19-23	Time; receipt of call	Q.2	code actual time e.g., 1010 = 10:10 and append codes 1 = AM 2 = PM such that 11141 = 11:14 AM 99999 = data missing
24-28	Time; arrival at scene	Q.2	as above
29-33	Time; arrival at destination	Q.2	as above except 88888 = question not applicable
34	Training; attendant 1	Q.4	1 = none 2 = informal training 3 = beginners Red Cross (or equivalent) 4 = advanced Red Cross (or equivalent) 5 = Basic EMT course 6 = Advanced EMT course 7 = other training 9 = data missing

Column(s)	Variable	Source	Codes
35	Training; attendant 2	Q.4	as above
36	Nature of call	Q.5	1 = emergency care only 2 = emergency transportation only 3 = emergency care and transportation 4 = non-emergency transportation 5 = no service 9 = data missing
37	Rescue/Extrication	Q.6	1 = R/E service provided 2 = no R/E service provided 9 = data missing
38	Destination	Q.7	1 = hospital 2 = other 9 = data missing
39-41	Hospital	Q.7	use hospital code as utilized in component four. 888 = not applicable; patient not taken to hospital 999 = data missing
42	Reason for selecting this hospital	Q.7	1 = patient request 2 = nearest 3 = special care required 4 = other reason 8 = not applicable; patient not taken to hospital 9 = data missing
43	Advance notification	Q.8	1 = yes; direct radio contact 2 = yes; indirect radio contact 3 = yes; other notification 4 = no notification 8 = not applicable; hospital not destination 9 = data missing

Column(s)	Variable	Source	Codes
44	Appropriateness	Q.10	1 = ambulance service appropriate 2 = ambulance service not appropriate 8 = not applicable; (false alarm) 9 = data missing
45-46	Location of scene	Q.9	assign county codes as used previously.
80	Card identifier	-	1 = card 1
Card 2			
1 -	Location of scene	Q.9	Code actual address of scene.

Example Codebook - Emergency Room Data

Column(s)	Variable	Codes
1-3	Hospital	001 - n (pre-determined)
4-5	Date (day)	code day of month 99 = data missing
6	Shift	1 = day 2 = evening 3 = midnight
7-11	Patient ID	00001 - n (pre-determined)
12	Transportation	1 = ambulance 2 = police 3 = other 9 = data missing
13	Emergency status	1 = non-emergency 2 = DOA 3 = emergency 9 = data missing
14-15	Location (county)	county code 98 = not applicable, case not an emergency or d.o.a. 99 = data missing
16-20	Location (zip)	zip code 00000 = data missing 99999 = not applicable, case not an emergency or d.o.a.
21--→	Further specification of location - if desired by HSA	code street address

Appendix C

Calculation of Means and Standard Deviations

Step 1

Calculate the total number of incidents that required emergency ambulance services by region during the 14-day study period.

Using Worksheet A, enter the number of incidents which required emergency ambulance services by day by county in the appropriate columns. These data are obtained from the hospital emergency room log sheet.

As indicated on Worksheet A, the number of incidents which, according to the emergency room staffs of the hospitals in the service area, required emergency ambulance services in county #1 during the 24-hour period of the first day of the study was 23. The following day it was 15, the following day 24, etc. The total number of incidents that required emergency ambulance services in county #1 during the 14-day study period was 304. The procedure illustrated in Worksheet A for calculating the total number of incidents in county #1 is to be carried out for each of the remaining 29 counties in this particular HSA. It should be noted that for regions constituting more than one county, e.g., region B, the total incidents for that region equal the sum of the total number of incidents for each of the counties contained within that region.

Step 2

Calculate the mean number of incidents that required emergency ambulance services by region during the 14-day study period.

Using Worksheet B, enter in column (1) the total number of incidents that required emergency ambulance services by region. This number for each region is obtained from the final column of Worksheet A.

Worksheet A

Incidents Requiring Emergency Ambulance Services by Region Per Day

Region	County	Day														Total Incidents
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
A	#1	23	15	24	20	22	30	22	21	20	17	21	22	24	23	304
B	#2	5														
	#3	11														
	#4	7														
	#5	10														
	#6	11														
	#7	128														
	#8	8														
	#9	6														
total		186														
C	#10															
D	#11															
E	#12															
	#13															
	#14															
Total																

J	#27															
	#28															
	#29															
	#30															
Total																

Worksheet B

Calculation of Mean Incidents by Region

Region	Total Incidents (1)	Mean Incidents $(1) \div 14$ (2)	Mean Incidents Squared $(2)^2$ (3)
A	304	21.7	471.5
B	↓	↓	↓
C			
D			
E			
F			
G			
H			
I			
J			

The numbers in column (1) are then divided by 14, and the quotients are entered under column (2). The numbers in column (2) represent the mean number of incidents requiring emergency ambulance services by region during the 14-day study period.

The numbers in column (2) are then squared, with the results entered under column (3). The mean incidents squared in column (3) will be needed in calculating the standard deviations.

Step 3

Calculate the squares of the number of incidents that required emergency ambulance services by region.

Using Worksheet C, enter the number of incidents that required emergency ambulance services by day by region under the column marked "I" These figures are obtained from the appropriate columns in Worksheet A.

The number of incidents entered under column "I" are then squared, and the results are entered under column "I^2". These figures will be needed in calculating the standard deviations.

Step 4

Calculate the standard deviations of the distribution of incidents that required emergency ambulance services in each region.

Using Worksheet D, enter the total of the squared number of incidents by region under column (1). These figures are obtained from the totals at the bottom of Worksheet C.

The figures in column (1) are then divided by 14, and the quotients are entered under column (2).

Worksheet C

Number of Incidents (I) and Number of Incidents Squared (I^2) by Region by Day

	A		B		C		J	
Day	I	I^2	I	I^2	I	I^2	I	I^2
1	23	529						
2	15	225						
3	24	576						
4	20	400						
5	22	484						
6	30	900						
7	22	484						
8	21	441						
9	20	400						
10	17	289						
11	21	441						
12	22	484						
13	24	576						
14	23	529						
total	304	6,758						

Worksheet D

Calculation of Standard Deviations by Region

Region	Total I^2	(1)÷14	Mean Incidents Squared	(2)-(3)	Standard Deviation $\sqrt{(4)}$
	(1)	(2)	(3)	(4)	(5)
A	6,758	482.7	471.5	11.2	3.4
B	↓	↓	↓	↓	↓
C					
D					
E					
F					
G					
H					
I					
J					

$$\text{standard deviation} = \sqrt{\frac{\Sigma I^2}{N} - \bar{I}^2}$$

I = number of incidents

$\bar{I}$ = mean number of incidents

N = number of days (14)

The mean incidents squared from column (3) of Worksheet B are then entered under column (3) of Worksheet D.

The figures in column (3) are then substracted from the figures in column (2), and the resulting figures are entered under column (4).

The square roots are then calculated for each of the figures in col- (4), and the results are entered under column (5). The figures in column (5) are the standard deviations of the distribution of incidents that required emergency ambulance services in each region.

Chapter 15

A Family Health Survey

I

STUDY METHODOLOGY

The family health survey provides data of considerable utility in both the description and analysis of the need for and utilization of health services. In addition, since the survey (unlike studies of ambulatory encounters, hospital discharges, etc.) gathers data from persons who are not participants in the medical care delivery system, it provides a valuable method of detecting barriers to access. On the other hand, the emphasis of the survey is on the provision of aggregate statistics for the area of interest. It is not designed to gather detailed information about specific health conditions, or specific health problems because the larger sample sizes and more detailed interviews required for such tasks would make survey costs prohibitive.

A. Definition of Concepts

The very number of concepts utilized either implicitly or explicitly in a survey of this complexity makes the definition of each virtually impossible. It is assumed that only HSAs which have staff members with the necessary skill and expertise will contemplate a survey, and that it is therefore not necessary to dwell upon generic methodological concepts. The following substantive concepts are those which are central to the survey and to the analysis and use of the resultant data.

- Disability: is a concept of fundamental importance to the survey. It is defined as any condition which causes the respondent to either 1) remain in bed all or most of one or more days, or 2) limit his or her usual activities during a specified time period. Both the occurrence of such disability and the number of days of disability are recorded. Although collected by way of only two questions, the disability data utilized in this survey are analogous to the NCHS concept of restricted activity.[1]

- Need for Services: the concept of need is acknowledged to be a central part of any model of the health services delivery system. However, except at the most general level (e.g., "some disturbance in health and well-being"[2]) it has no consensually accepted meaning. In this survey, need is operationally measured by disability—persons with higher levels of disability (i.e., more disability days) are considered to have greater need for services. This has the obvious problem of ignoring sometimes critical needs for service which are not manifested in disability in that they are asymptomatic to the lay individual. Furthermore, this use equates days of disability deriving from such conditions as the common cold with those which result from far more serious health problems. On the other hand, the use of disability days does serve to standardize a measure of need throughout the population, and to measure the concept in terms other than the perceptions of consumers.*

- Utilization of Service: is, in this survey, limited to the physician contact. Several variables are utilized in examining such contacts, including their occurrence and number in the preceeding two weeks and one year, whether or not the contact is in response to any reported disability, whether or not a respondent failed to see a doctor when wished to do so, etc.

- Use of Needed Service: recent work in the area of health services research has emphasized the extent to which services which are needed are in fact utilized.[3] In this survey, the operational measures of need (disability days) and use (physician contacts) noted previously are combined in a single measure of the use of needed service, i.e., the use/need discrepancy ratio. These ratios, such as doctor contacts per 100 disability days are considered measures of access to service.[4]

  The ratios are aggregate statistics,however, and do not provide a means of examining the extent to which an individual had one or more physician contacts as a response to a specific episode of disability. In order to examine such questions at the individual level, the questionnaire is structured such that following the question on disability, the respondent is asked whether or not he/she saw a doctor in response to that disability.

- Barriers to Access: inasmuch as the ratios and the question regarding physician contacts in response to disability

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*A more detailed discussion of the issues surrounding the definition and measurement of need can be found in A. Donabedian, Aspects of Medical Care Administration, Harvard University Press: Cambridge, 1973, pp. 58-207.

provide a means of identifying population segments which under-utilize (or fail to utilize) needed service, the concept of barriers to such utilization becomes meaningful. Both attitudinal and structural barriers have been examined in the literature and some current research is directed towards the simultaneous analysis of both types of barriers.[5] The current survey includes several questions related to structural variables which may represent barriers (presence of a usual source of care, income, and distance to the usual source of care).

B. Definition of Variables

The limited survey described here includes a much smaller number of variables than is often the case in family health surveys. It is acknowledged that some HSAs may wish to add questions and/or encode a variety of such additional information as interview date and time, interviewer identification, a record of calls, detailed address information, etc. Hence, the definitions provided below emphasize the core variables of a substantive nature. Suggested coding categories are provided in Appendix B.

- family identifier: each family should be provided a unique identification code. The code will be repeated for each member of the family.
- family size: the number of family members for whom data are gathered. Family membership will typically be operationalized as persons who usually live in the household (i.e., housing unit) who are related to the head, including persons temporarily away from home at the time of the interview.
- family head: the head of the family is the person the respondent names as the head. In most cases, the head earns the most money in the family, though this is not always true. In some cases, the head may be the parent or the chief earner or may be the only adult member of the family.
- family income: total income of all family members (as previously defined) including income from wages, salaries, commissions, pensions, dividends, welfare or any other money income. Gross cash income (i.e., before taxes) is to be obtained. This will be the respondent's estimate of the total family income.

- poverty status: the current family size and income cut points employed by the U.S. Department of Agriculture can be used to determine whether each family unit is above or below the poverty line. These poverty level cut points vary over time and location.

- race: the race of the head of the household should be determined. Frequently, a "black, white, other" trichotomy is used, but HSAs whose population includes substantial numbers of persons from other racial/ethnic groups may wish to specify such membership in greater detail.

- individual identifier: a unique number should be arbitrarily assigned to each member of the family. In conjunction with the family ID, this will provide a unique identifier for each case.

- relationship to head: each individual must be provided with a code identifying his/her relationship to the head of the household.

- age: the specific age of each family member should be coded in years. Children under one year of age can be coded '00'. These ages can be grouped as desired for the construction of tables.

- sex: male, female

- education: the code should refer to the number of grades of school completed, defined to include only grades completed in a regular school where persons are given formal education in graded public or private school, whether day or night schools, and whether attendance was full-time or part-time. A "regular" school is one that advances a person toward an elementary or high school diploma or a college, university, or professional school degree. A code '00' thus means no formal education, a code 12 means the individual completed 12th grade, etc.

- occurrence of two-week restricted activity days: whether or not each person experienced, in the preceding two weeks, any days of restricted activity. NCHS defines a restricted activity day as one in which a person cuts down on his usual activities for the whole of that day because of an illness or injury. The term "usual activities" for any day means the things that the person would ordinarily do on that day. For children under school age, usual activities depend on whatever the usual pattern is for the child's day, which will in turn be affected by the age of the child, weather conditions and so forth. For retired or elderly persons, usual activities might consist of almost no activity, but cutting down on even a small amount for as much as a day would constitute restricted activity. On Sundays or holidays usual activities are the things the person usually does on such days—going to church, playing golf, visiting friends or relatives, or staying at home and listening to the radio, reading, looking at television and so forth. Persons who have permanently reduced their usual activities because of a chronic condition might not report any restricted activity days during a two-week period. Therefore, absence of restricted activity days does not imply normal health.

Restricted activity does not imply complete inactivity but does imply only the minimum of usual activities. A special nap for an hour after lunch does not constitute cutting down on usual activities, nor does the elimination of a heavy chore like cleaning ashes out of the furnace or hanging out the wash. If a farmer or housewife carries on only the minimum of a day's chores, however, this is a day of restricted activity.

Days of bed-disability, days lost from school or work and days spent in the hospital are all days of restricted activity.

- number of two-week restricted activity days: the number of days of restricted activity is to be recorded. All persons responding negatively to the occurrence question are coded as having had zero restricted days.

- responsive doctor contact: whether or not each individual who reported having had one or more restricted activity days contacted a physician in response to the condition which caused the restricted activity. Doctor contact is defined in a manner similar to that used by NCHS, i.e., "doctors" include only duly licensed M.D.s or D.O.s or persons working under their direct supervision, and "contacts" include telephone contacts, or face to face contacts, but exclude mass treatment situations, or contact while the respondent is an inpatient.

- reason for no responsive doctor contact: for those persons who did not contact a physician in response to the condition causing restricted activity, the reason for the lack of contact is recorded. Suggested response categories are:

(1) recent onset of illness or injury (i.e., person has not yet had time to contact a doctor, or an appointment is scheduled, etc.)

(2) couldn't get an appointment

(3) didn't know of a doctor to go to

(4) didn't have enough money

(5) didn't have a way to get to the doctor

(6) too far to the doctor, takes too much time

(7) condition not serious enough to contact a doctor

(8) other reason

- chronic health problem: whether or not each person has any longstanding health condition is determined. Longstanding is defined as being of three months or longer duration.

- two-week doctor contacts: for all persons and without regard to any restricted activity, the number of doctor contacts during the preceding two weeks is to be recorded. Doctor contact is defined as noted above.

- one year bed-disability days: for each person the number of days during the preceding year in which bed-disability was experienced is to be recorded. NCHS defines bed-disability days as those in which the person was kept in bed either all or most of the day because of illness or injury. All or most of the day is defined as more than half of the daylight hours (or of the hours that the person is usually awake, if the person works a night shift). Taking a nap on "general principle" should not be counted as a day in bed. Also, count all days as a patient in a general hospital as bed days whether or not the patient was actually lying in bed at the hospital. Consider a bed as anything used for sleeping, including a sofa, cot or mattress.

- one year doctor contacts: for each person, the number of doctor contacts in the preceding year is to be recorded. Doctor contacts are defined as above.

- failure to see a doctor: whether or not each person did not see a doctor at some time during the preceding year when he or she wished to do so is to be recorded.

- reason: for those persons who are noted as having failed to see a doctor when they wished to do so, the major reason for this failure is recorded. Suggested response categories are:

(1) couldn't get an appointment

(2) didn't know of a doctor to go to

(3) didn't have enough money

(4) didn't have a way to get to the doctor

(5) too far to the doctor, takes too much time

(6) other reason

- usual source of care: the emphasis here is on the word "usual," since we are interested in the doctor or place that the person most often goes to for medical attention. For responses other than "no usual place" and "doctor's office" a probe may be required to differentiate hospital outpatient clinics from free-standing or industrial clinics, and to differentiate emergency rooms from hospital outpatient departments.

- time to usual source of care: for all persons except those who have no usual source of care, the amount of time it usually takes to get to the usual source should be recorded. The time should be converted to minutes.

- detailed address information: (optional) the complete mailing address of the family should be obtained, including street name, number, city or town and zip code.

C. Study Instrument

The instrument to be used in obtaining the above variables is presented on the following pages. This instrument has been adapted from those utilized by NCHS and the Experimental Health Services Delivery System surveys. It is presented here in an abbreviated form shown with only four family member response columns. An extra page, containing columns for family members 5 through 8 can be inserted at the time of the interview.

All questions on the instrument are phrased as they would be directed to the respondent. In reference to each other member of the family, the terms in parentheses will be changed, by the interviewer, as appropriate. In addition, it should be noted that the instrument includes instructions to the interviewer, under certain circumstances, to skip certain questions. It is important that these skip patterns be carefully followed. Partly as a result of these skip patterns, the instrument has not been pre-coded. The additional coding step will add to the time (and hence the cost) of the survey, but previous experience has indicated that this type of questionnaire is not well suited to direct punching.[6] As it stands, each box in the response columns can contain only one of three types of information:

1) a fixed choice response can be checked, indicating that the respondent was asked this question and that he/she responded as indicated.

2) the box might contain a written specification indicating that the respondent did not know the answer, refused to answer, terminated the interview prior to this question or responded with an answer that did not fit any of the check-off options. In this case, the specification must be written in the box in the blank area provided.

3) the box may be left blank. This indicates that this question was not asked for this person. A box can be blank only in the case where the "go to" instructions prevented the interviewer from asking the question.

The cover sheet provided with this instrument is intended to serve as an example. It is designed assuming the use of a telephone survey and would be modified in the case of personal interviews or a mailing technique, or in cases where an HSA wishes to incorporate information of particular interest in its own setting.

Central HSA Family Health Survey

Notice: All information which would permit identification of the individual will be held in strict confidence, will be used only by persons engaged in and for the purposes of the survey, and will not be disclosed or released to others for any purpose.

Family Identifier ____________________

Telephone Number ____________________

Interviewer's Number ____________________

Record of calls	1	2	3	4	5	6	7	8
Date:								
Time of call:	am pm	am pm	am pm	am pm	am pm	am pm	am pm	am pm

Interview Status:

- ☐ completed interview
- ☐ partial interview (describe)

____

____

- ☐ refusal
- ☐ no answer after _____ attempts
- ☐ other, specify:

____

____

Interviewer Signature ____________________

HELLO,

THIS IS (name of interviewer). I AM CALLING YOUR HOME TO SEEK YOUR COOPERATION IN THE SURVEY BEING CONDUCTED BY (name of organization). IS THIS (telephone number)?

If it is not the correct number, apologize and hang up.

If it is the correct number, proceed.

MAY I SPEAK WITH THE PERSON IN YOUR FAMILY WHO KNOWS THE MOST ABOUT THE HEALTH AND MEDICAL CARE OF YOUR FAMILY?

If the person originally answering the phone is the most knowledgeable family member (that is, the respondent), proceed.

If the person originally answering the phone is not the respondent, repeat the introduction when the respondent comes to the phone. /THIS IS........../ Then proceed.

BEFORE WE BEGIN, I WOULD LIKE TO ASSURE YOU THAT ALL THE INFORMATION YOU GIVE IS COMPLETELY CONFIDENTIAL AND THAT NONE OF IT WILL BE RELEASED IN ANY WAY THAT WOULD PERMIT IDENTIFICATION OF YOU OR YOUR FAMILY. YOUR PARTICIPATION IS OF COURSE VOLUNTARY. THIS SHOULD TAKE ABOUT FIFTEEN MINUTES.

Immediately ask Question 1.

1. WHAT IS YOUR NAME?

Enter name in column 1 at top of questionnaire.

---

2. WHAT IS THE NAME OF THE HEAD OF YOUR FAMILY LIVING IN THIS HOUSEHOLD?

If respondent is "head," write "head" for relationship in column 1
Otherwise enter name on the next column and write "head."

---

3. WHAT ARE THE NAMES OF ALL OTHER PERSONS LIVING HERE NOW WHO ARE RELATED TO (head) ?

Enter first names in subsequent columns. If more than 4 in family, prepare a second questionnaire, and renumber columns as needed.

For each person listed, ask:

4. HOW IS __________ RELATED TO (head) ?

Fill in "RELATIONSHIP" for each person.

---

5. HOW OLD WAS _________ ON (HIS/HER) LAST BIRTHDAY?

Enter age and circle sex. If sex is not apparent from the name, be sure to ask.

6. During the past two weeks, were there any days that (you) cut down on the things (you) usually (do) because of illness of injury?

7. How many days during the past two weeks did (you) cut down on the things (you) usually (do)?

8. (Have) (you) seen or talked to a medical doctor about the illness or injury that caused (you) to cut down on the things (you) usually (do)?

9. What was the main reason that (you) did not see a doctor about this illness or injury?

(1) recent onset of illness or injury (haven't yet had a chance to make a doctor's appointment; a doctor visit is scheduled, etc.)
(2) couldn't get an appointment
(3) didn't know of a doctor to go to
(4) didn't have enough money
(5) didn't have a way to get to the doctor
(6) too far to the doctor, takes too much time
(7) condition not serious enough to contact a doctor
(8) other (specify)

10. (Do) (you) have any health problem or illness that (you) (have) had for more than three months?

11. During the past two weeks, how many times altogether did (you) see or talk to a medical doctor about any health problem or illness?

12. During the past 12 months, since /date/ a year ago, about how many days did (you) stay in bed all or most of the day because of any illness or injury?

13. During the past 12 months, how many times did (you) see or talk to a medical doctor? (Do not count doctors seen while a patient in a hospital.) (Include the ___ visits you already told me about.)

14. During the past 12 months, was there any time (other than the time(s) you already told me about) that (you) wanted to see a doctor but for some reason did not?

15. What was the main reason that (you) did not see a doctor when (you) wanted to?

(1) couldn't get an appointment
(2) didn't know of a doctor to go to
(3) didn't have enough money
(4) didn't have a way to get to the doctor
(5) too far to the doctor, takes too much time
(6) other (specify)

16. Where (do) (you) usually go when (you) want to see a doctor—to a clinic, hospital, doctor's office, or some other place?

If clinic, is it a hospital outpatient clinic, a company clinic or some other kind of clinic?
If hospital, is it to the hospital outpatient clinic or to the emergency room?
If "other place" what type of place is it? (specify)

17. How long does it usually take (you) to get there from home?

18. How many years of education have (you) completed?
(NOTE: Ask this question only with reference to persons 17 years of age and older.)

	1	2	3	4
	NAME	NAME	NAME	NAME
	RELATIONSHIP	RELATIONSHIP	RELATIONSHIP	RELATIONSHIP
	SEX M F AGE	SEX M F AGE	SEX M F AGE	SEX M F AGE
6.	___ Yes ___ No (Go to Q. 10)	___ Yes ___ No (Go to Q. 10)	___ Yes ___ No (Go to Q. 10)	___ Yes ___ No (Go to Q. 10)
7.	___ # of days	___ # of days	___ # of days	___ # of days
8.	___ Yes (Go to Q. 10) ___ No	___ Yes (Go to Q. 10) ___ No	___ Yes (Go to Q. 10) ___ No	___ Yes (Go to Q. 10) ___ No
9.	___ Recent illness ___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Not serious enough ___ Other reason	___ Recent illness ___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Not serious enough ___ Other reason	___ Recent illness ___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Not serious enough ___ Other reason	___ Recent illness ___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Not serious enough ___ Other reason
10.	___ Yes ___ No	___ Yes ___ No	___ Yes ___ No	___ Yes ___ No
11.	___ # of times	___ # of times	___ # of times	___ # of times
12.	___ # of days	___ # of days	___ # of days	___ # of days
13.	___ # of times	___ # of times	___ # of times	___ # of times
14.	___ Yes ___ No (Go to Q. 16)	___ Yes ___ No (Go to Q. 16)	___ Yes ___ No (Go to Q. 16)	___ Yes ___ No (Go to Q. 16)
15.	___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Other reason	___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Other reason	___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Other reason	___ No appointment ___ No doctor ___ No money ___ No transportation ___ Too far ___ Other reason
16.	___ No usual place(Go to Q18) ___ Doctor's office CLINIC: ___ Hosp. Outpt. ___ Company ___ Other Clinic HOSP: ___ Outpt. Dept. ___ Emergency Room	___ No usual place(Go to Q18) ___ Doctor's office CLINIC: ___ Hosp. Outpt. ___ Company ___ Other Clinic HOSP: ___ Outpt. Dept. ___ Emergency Room	___ No usual place(Go to Q18) ___ Doctor's office CLINIC: ___ Hosp. Outpt. ___ Company ___ Other Clinic HOSP: ___ Outpt. Dept. ___ Emergency Room	___ No usual place(Go to Q18) ___ Doctor's office CLINIC: ___ Hosp. Outpt. ___ Company ___ Other Clinic HOSP: ___ Outpt. Dept. ___ Emergency Room
17.	___ # of minutes	___ # of minutes	___ # of minutes	___ # of minutes
18.	___ # of years ___ NA - Under age 17	___ # of years ___ NA - Under age 17	___ # of years ___ NA - Under age 17	___ # of years ___ NA - Under age 17

19. I WOULD LIKE TO GET THE COMPLETE MAILING ADDRESS FOR YOUR HOME. [Interviewer: Be certain to get the complete address, including zip code.]

________ / ________________ / ____________ / ________ / ____________
number / street / city / state / zip code

---

20. IN ORDER TO KNOW IF WE HAVE A CROSS SECTION OF ALL PEOPLE, WOULD YOU TELL ME WHAT RACIAL OR ETHNIC GROUP YOUR FAMILY BELONGS TO?

- ☐ White
- ☐ Negro or Black
- ☐ Mexican American
- ☐ Puerto Rican
- ☐ American Indian
- ☐ other, specify ____________________
- ☐ mixed, specify race of head ____________________

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21. NOW I WOULD LIKE YOU TO ESTIMATE THE TOTAL COMBINED INCOME OF YOUR FAMILY FOR THE PAST 12 MONTHS—THAT IS YOUR INCOME, ____________'s, ____________'s, etc.
PLEASE INCLUDE INCOME FROM ALL SOURCES, THAT IS, WAGES, SALARIES, SOCIAL SECURITY OR RETIREMENT BENEFITS, HELP FROM RELATIVES, RENT FROM PROPERTY, AND SO FORTH.

$____________________ per ☐ year
☐ month
☐ week

☐ DK

D. Data Collection Design

The universe for a family health survey will typically be defined as the resident population of the HSA. Family health surveys (as implied by the term) are designed in a manner that allows the use of either families or individuals as units of analysis, with emphasis on the latter. Thus, sampling issues will be of substantial significance.

It is virtually impossible to describe a single sampling process that will serve the objectives of various HSA situations. In previous implementations of this type of survey, sampling procedures have included simple random samples, multi-stage cluster samples, multi-stage area probability samples, multi-stage stratified samples and some combination techniques. Since HSAs are likely to be extremely diverse in terms of structure and survey objectives, a great variety of sampling techniques are likely to be employed.

In the case of a telephone survey a simple random sample from directories may be employed.* For personal interviews or mailed surveys, a multi-stage sampling procedure that allows the selection of areas, and then smaller units (e.g., census tracts, city blocks) is expected to be the most efficient approach. Stratification will be valuable in HSAs which have diverse subpopulation units which are known to vary along dimensions of substantive interest to the HSA as indicated by its own statement of objectives. For example, if an HSA has particular interest in making comparisons along a rural/urban dimension, it may wish to construct a stratified sample that insures an adequate number of cases from each of these strata. Careful examination of the appropriate sampling literature is recommended. In many cases, the HSA should give serious consideration to hiring consultants or firms with the necessary expertise to assist in sample construction.

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*Telephone surveys will require adjustments in sampling techniques to account for persons with unlisted telephone numbers or no telephones.

In developing a sample design, the following points should be specified:

1) description of the population to be surveyed
2) type of sample (simple random, proportional stratified, cluster, area probability, multi-stage, etc.)
3) sampling unit (the dwelling unit is assumed to be the sampling unit in this survey)
4) sample size
5) sampling ratio and weighting procedures
6) the sample frame (public utility subscribers, names in telephone book, combinations of several sources, etc.)
7) errors of estimation and quality controls for sample selection

The aggregate statistics to be derived from these data will not require the large sample that a study of disease patterns would dictate, but careful attention must be given to the various alternatives available in developing a sample design if costs are to be contained. The sample design should be kept as simple as possible.

The following discussion of field procedures assumes that within the general model of a sample survey, the telephone interview will be the mode of data collection. It should be noted, however, that similar data have been successfully gathered using personal interviews.

E. Field Procedures

Pretesting

The extent of pretesting required will depend upon the extent to which the HSA chooses to modify and/or supplement the instrument outlined earlier. If the instrument is modified to any substantial degree, a small sample of respondents should be selected and a careful pretest conducted. The HSA will wish to take care that the pretest sample includes persons from a diversity of situations similar to the diversity of the ultimate target population. As is always the case, only interviewers of known skill should be utilized in the pretest, in order that the HSA can reasonably assume that any problems derive from the instrument rather than the interviewers.

Procedures to Elicit Study Participation

The elicitation of cooperation from respondents in this type of survey involves two phases. The first phase occurs prior to study implementation and is essentially directed at fostering a positive attitude in the entire community. Press releases to local media describing the intended study are useful in this regard. In addition, once the sample has been selected a mailing of the so-called "dear neighbor letter" to each prospective respondent should be completed. This letter should include a brief description of the survey and its importance. The need for each selected respondent's participation should be emphasized and an appropriate assurance of confidentiality should be included. The letter should also indicate the approximate time period during which the survey will be taking place.

The second phase of efforts to elicit cooperation takes place during the actual data collection process. It involves making call-backs in order to complete interviews at a convenient time for respondents, observing appropriate decorum and good manners during the interview, approaching the interview in a professional manner, etc. In sum, once having dispatched dear neighbor letters and provided necessary publicity, the HSA in essence vests all control over eliciting cooperation in the hands of the survey field personnel. Therefore, the selection, training and supervision of the survey interviewers becomes critical.

Data Collection Personnel

The precise numbers, training and background of the data collection personnel required to field a family health survey will, of course, vary depending upon the specific nature of the survey and the structure of the HSA. The present discussion assumes a telephone interview using the instrument presented above (or one similar in length and complexity), an HSA with both rural and urban areas, and a sampling design yielding approximately 1500 families (interviews). In is further assumed that a senior member of the HSA's research staff will serve as overall study director.

The additional data collection personnel should include a field work supervisor, an assistant, an unspecified number of interviewers, coding clerks, keypunchers and a computer programmer. The supervisory people and the computer programmer (the latter need only be familiar with such packaged programs as SPSS) may well be permanent in-house staff. The interviewers and coding clerks will in all likelihood be temporary employees recruited specifically for the conduct of this survey.

The interviewers can be recruited from a variety of sources. Surveys using community recruits have been successfully implemented,[7] and in some cases, members of local service clubs may be willing to serve as interviewers. More frequently, social science students from nearby universities are recruited for this purpose. Such individuals will often have had experience in, or at least exposure to, the process of interviewing, and in addition can often be recruited with lower levels of remuneration.

Although the source of interviewers and their prior experience will affect the amount and nature of training required, a survey of this complexity demands that interviewers be trained with considerable care. Either the study director or the field work supervisor will conduct the training. Following is a brief outline of the essential issues which must be covered over the course of the training period.

The order of discussion is not material. Obviously, some of these issues will have greater or lesser significance depending upon the specific survey. This outline has been adapted from Weinberg,[8] which is an excellent source of information and discussion regarding these issues.

1) general information about surveys
    - overview of social research and its uses
    - steps in conducting a survey
    - overview of sampling and why it is done
2) ethics of research
    - confidentiality of all information gathered in surveys
    - anonymity of respondents
    - faithful reporting by interviewer
3) general information about the HSA and this survey
    - short orientation on the HSA
    - how the survey will benefit the community
4) preparing to go into the field
    - positive attitude
    - voice appeal
5) the approach
    - introducing yourself
    - how to handle yourself with persons who are uncomfortable, suspicious or otherwise reluctant
    - gaining respondent's cooperation
6) setting the stage
    - establishing rapport
    - maintaining a professional manner
    - setting the respondent at ease
7) interviewing technique
    - asking the questions as they are printed and in proper order
    - verbatim recording
    - how and when to probe
    - how to end the interview

8) administrative details

   - payment policies and procedures
   - how to fill out time and expense reports
   - when to report to the office for conference
   - when and how to turn in completed work

9) role-playing practice on try-out questionnaires, and discussion of problems that arose in try-out interviews

10) role-playing practice on actual survey questionnaire

11) discussion of all survey materials and instructions in their use

12) discussion of validation and its public relations function

13) review of the interviewer's role in the research process

All completed interview schedules will be reviewed, checked and edited by the assistant field work supervisor. The same person will also typically have the responsibility for validation checks (telephone contacts with respondents to insure that the interview was in fact completed and that the information is accurate) and the training and supervision of the coding clerks. The latter individuals will be required to transfer the collected data from the completed questionnaires to coding sheets, from which the data will in turn be keypunched. If time constraints permit, it will be efficient to hire several of the most skilled interviewers to do the coding, since these individuals will already have familiarity with the data. The computer programmer should be consulted regarding the development of a codebook and preparations for the coding procedure.

The numbers of each of these required groups of personnel will be a function of the number of cases. There should be a large enough number of each type to insure that the various stages of data preparation do not occupy unnecessary amounts of time, but the numbers must be kept small enough to make training efficient.

Data Collection Procedures

The actual collection of the interview survey data has three major steps. First, the precise sample elements must be listed and apportioned among the interviewers. That is, it is assumed that each interviewer will be provided a list of the specific telephone numbers to be called for purposes of conducting an interview. Second, the interviews are completed, and third, the validation checks, editing and coding are completed. Contained in Appendix A are the interviewing techniques that should be employed by each interviewer during the conduct of the interview.

Quality Control

As was the case regarding the elicitation of cooperation, much of the control over data quality lies in the hands of the interviewers. Hence, their training and commitment are critical to the collection of quality data. In addition, the editing of completed questionnaires, validation call-backs, and careful coding procedures represent useful techniques of quality control. The following guidelines will enhance these efforts:

1) all interview forms should be numbered before they are provided to the interviewers

2) all completed interviews should be checked for errors, omissions or inconsistencies

3) a random sample (approximately 10%) of respondents for all completed interviews should be telephoned to insure that the interview in fact occurred

4) if an interviewer is discovered to have substituted or curb-stoned, all of that interviewer's cases should be validated and new interviews completed

5) the coding should be approached with great care, using only the most skilled personnel available. It should be completed as quickly as possbile following the interviews.

F. Data Processing and Storage

The preliminary portions of the data processing have been discussed in previous sections. It is assumed that the editing of instruments and coding will be completed by study staff and that in most cases the keypunching will be sub-contracted. Keypunching should be verified. While a data file of this size may ultimately be stored on tape or other system-specific storage device, it is recommended that data not be directly transferred from coding sheets to tape. The slower process of punching data onto cards represents a means of further checking the consistency of data, and correction of errors is much easier on cards than tape.

It should be noted that in keeping with the dual levels of analysis (family and individual) that are part of this survey, it is recommended that the data records be linked by family and individual. The family information should thus be coded in the first columns of each record, followed by the individual data. Obviously, the initial several columns will be duplicated for all members of a given family. In this way it will be possible to efficiently construct tables referring either to families or individuals.

The example codebook provided later in this section utilizes this approach. It is emphasized however, that the coding conventions suggested there embody only one possible approach and are limited to "core" portions of the data. A variety of other variables might be included or other systems employed. A more detailed example referring to similar data is available in A. M. Kulley, et al.[9]

II

DATA ANALYSIS AND USE

A. Measures of Health Status

1. Disability

The needs of an HSA for health status measures and the use of disability data in deriving such measures have already been discussed in a previous section of this Handbook (Section II). As was noted in Chapter 5 of Section II, disability data can be used to calculate:

1) the number of persons experiencing disability in various population sub-groups, and

2) the number of disability days per person in various population sub-groups.

Two questions in this survey will provide the data necessary for calculating the first of these measures, i.e., the prevalence of disability among the residents of Central HSA. The number of persons who reported having one or more two-week restricted activity days can be obtained from question 6, and the number of persons who reported having one or more one year bed-disability days can be obtained from question 12.

The prevalence of disability in the population can be estimated according to the following formula:

$$PD = \frac{nd}{n} \times 100$$

where,

PD = prevalence of disability (i.e., the percent of sampled individuals reporting disability days).

nd = the number of persons in the survey sample or sub-sample who reported having one or more disability days.

n = the total number of persons in the survey sample or sub-sample.

Presented in Table 1 are the results of applying the above formula to the data from this survey pertaining to two-week restricted activity days. In the first column of Table 1 are the total number of persons (n) in the various socio-demographic sub-groups of the survey sample (these sample sub-groups are assumed to be representative of similar sub-groups in the population of Central HSA). In the second column are the number of persons (nd) in these same socio-demographic sub-groups who reported having one or more two-week restricted activity days (i.e., those persons who responded "yes" to question 6). Presented in the last column of Table 1 is simply the percentage of those persons in the various socio-demographic sub-groups who reported one or more two-week restricted activity days (i.e., [nd/n] x 100).

The data in Table 1 can provide HSAs with useful information concerning the health status of their service areas' residents. As shown in Table 1, for example, the prevalence of disability is highest in the aged and below poverty sub-groups of Central HSA. The prevalence of disability among these sub-groups is over twice that of the overall HSA (36% as compared to 17% respectively). Comparisons of this type can assist HSAs in identifying the population sub-groups toward which responsive action is most needed in order to improve the health status of their areas' residents.

The first type of disability measure answers the question of *how many* individuals in the population experienced disability. Another type of measure can be used to answer the question of *how much* disability the population experienced. This measure, the rate of disability per

Table 1

Number and Percent of Persons with Two-week Restricted Activity Days, by Age, Sex, Race and Income, Central HSA*

Age/Sex/ Race/Income	Number of Persons in the Sample (n)	Number of Persons Reporting Disability (nd)	Percent (PD)
Age	5,000	860	17%
0-16	1,500	180	12%
17-44	2,000	300	15%
45-64	1,000	200	20%
65+	500	180	36%
Sex			
Male	2,400	340	14%
Female	2,600	520	20%
Race			
Black	750	150	20%
White	4,000	670	17%
Other	250	40	16%
Income			
Above Poverty	4,000	500	13%
Below Poverty	1,000	360	36%

*For this and all other tables in this section, it is assumed that there are no missing data.

person, can be estimated according to either of the following two formulas:

type (a) $RD = \frac{dd}{nd}$

type (b) $RD = \frac{dd}{n}$

where,

RD = rate of disability (i.e., the number of disability days per person)

dd = the number of reported disability days

nd = as previously defined

n = as previously defined

The type (a) rate expresses the average number of disability days (dd) experienced by those persons who reported having such days (nd). The type (b) rate expresses the average number of disability days (dd) experienced by the total number of persons in the survey sample or sub-sample (n).

Presented in Table 2 are the results of applying the type (b) formula to the data from this survey pertaining to one year bed-disability days. The total number of persons (n) in the various socio-demographic sub-groups of the survey sample are again in the first column of the table. In the second column are the number of reported one year bed-disability days (i.e., the sum of the number of days reported in response to question 12) for persons in the respective socio-demographic sub-groups. In the third column of Table 2 is simply the number of bed-days per person (i.e., [dd/n]). Similar rates of bed-disability for the U.S. population are presented in the last column.

HSAs can use the data provided in Table 2 in making comparisons between the health status levels of their areas' population and the population of the United States. As shown in Table 2, for example, the overall health status of Central HSA's population, as measured by the rate of bed-disability per person per year, is very similar to

Table 2

Number and Rate of Bed-Disability Days per Person per Year, by Age, Sex, Race and Income, Central HSA and the U.S.

Age/Sex/ Race/ Income	Sample (n)	Number of Bed-Disability Days Reported (dd)	Days of Bed-Disability per Person per Year (RD)	
			Central HSA	U.S.*
Age**	5,000	30,000	6.0	6.1
0-4	400	1,750	4.4	5.0
5-14	1,000	4,250	4.3	4.8
15-24	850	3,500	4.1	4.4
25-44	1,250	5,500	4.4	4.9
45-64	1,000	6,750	6.8	7.4
65-74	350	5,500	15.7	10.1
75+	150	2,750	18.3	18.5
Sex				
Male	2,400	10,000	4.2	5.4
Female	2,600	20,000	7.7	6.8
Race				
White	4,000	22,000	5.5	5.9
All Other	1,000	8,000	8.0	7.6
Income				
Above Poverty	4,000	18,000	4.5	-
Below Poverty	1,000	12,000	12.0	-

*National Center for Health Statistics, "Disability Days: United States, 1971," Vital and Health Statistics, Series 10, No. 90, June 1974, pp. 21 and 31.

**The age categories used here and in other tables of this section are inconsistent as a result of presenting data that are comparable to U. S. figures available from NCHS.

the overall health status of the U.S. population (6.0 as compared to 6.1 respectively). When comparing specific sub-groups of the population, however, noteable differences exist. Of particular interest is the difference in bed-disability rates among those persons aged 65-74. The bed-disability rate in this age group in Central HSA is over 50% higher than the comparable rate in the U.S. (15.7 as compared to 10.1 respectively). Comparisons such as these can aid HSAs in identifying those sub-groups in their service area's populations deserving of priority consideration in their area health planning and resources development programs.

These types of comparisons, however, raise certain statistical issues. For instance, since both the Central HSA and U.S. figures in Table 2 are based on samples and are therefore subject to sampling error, it is necessary to determine if differences like those indicated in Table 2 reflect "real" differences in the two populations or simply differences in the samples. This issue is not subject to an absolute answer. Rather, statistical techniques allow the estimation of a probability that differences between two sample estimates would fall within some specified interval around the true differences between the two populations.

One method of assessing this probability is based on the concept of standard error, which is a measure of sampling variability. Essentially, what is required is the setting of limits around an estimate such that one can state at some specified probability level (e.g., .95) that the estimate falls within a given range. In a case such as the comparisons noted in Table 2, this setting of an interval will be required for both the national and local estimates. This would allow the planner to determine the probability that any difference between the two estimates reflects a "real" difference as opposed to differences due to sampling variability.

An example of a test which would be relevant to Table 2 (since the figures contained there are means) is the t-test of the difference between two means. The mathematical details of that procedure are explained in Chapter 2 of Section I.

2. Chronic Health Problems

Another measure of health status which can be derived from the data obtained in this survey is the prevalence of chronic health problems. The formula for estimating the prevalence of chronic health problems is similar to the formula for estimating disability:

$$PC = \frac{cp}{n} \times 100$$

where,

PC = prevalence of chronic health problems (i.e., the percent of sampled individuals reporting a chronic condition)

cp = the number of persons in the survey sample or sub-sample who reported having a chronic condition

n = as previously defined

Presented in Table 3 are the results of applying the above formula to the data obtained in response to question 10 of the survey.* The uses of the data in Table 3 are similar to those described above for the data in Table 1.

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*Because of the differences in the definition of chronic health conditions used here and by NCHS, it is not possible to obtain comparative national estimates to those in Table 3 for Central HSA. For NCHS's definition of a chronic condition, see "Current Estimates from the Health Interview Survey: United States-1974" Vital and Health Statistics, Series 10, No. 100, September 1975, pp. 44-45.

Table 3

Number and Percent of Persons with a Chronic Health Problem, by Age, Sex, Race and Income, Central HSA

Age/Sex/ Race/Income	Sample (n)	Number of Persons with a Chronic Condition (cp)	Percent (PC)
Age	5,000	1,250	25%
0-16	1,500	175	12%
17-44	2,000	500	25%
45-64	1,000	350	35%
65+	500	225	45%
Sex			
Male	2,400	550	23%
Female	2,600	700	27%
Race			
Black	750	200	27%
White	4,000	1,000	25%
Other	250	50	20%
Income			
Above Poverty	4,000	800	20%
Below Poverty	1,000	450	45%

B. Patterns of Physician Utilization

Data pertaining to the utilization of a physician are obtained in two questions of the survey. The number of two-week physician contacts is obtained in response to question 11, and the annual number is obtained in response to question 13. Like the data on disability, these data can be used in estimating both the number of persons who contacted a physician and the number of physician contacts per person. In calculating the rate of physician utilization, the following formula can be used:

$$PU = \frac{pv}{n}$$

where,

PU = rate of physician utilization (i.e., the number of physician visits per person per year)

pv = the number of reported physician visits

n = as previously defined

The number and rate of physician visits per person per year for various socio-demographic sub-groups in Central HSA and the United States are presented in Table 4. With the information provided in Table 4, HSAs can assess the patterns of physician utilization among their areas' residents and comparisons can be made across the various sub-groups within the HSA as well as between similar sub-groups in the HSA and the United States. Concerning the first type of comparison, it is interesting to note in Table 4, for example, that the rate of physician utilization in Central HSA is higher for those persons below poverty as compared to those above poverty. Concerning the second type of comparison, the data in Table 4 show that certain sub-groups in Central HSA exhibit a rate of physician utilization which is lower than their comparable sub-groups in the United States by as much as

Table 4

Number and Rate of Physician Visits per Person per Year, by Age, Sex, Race and Income, Central HSA and the U.S.

Age/Sex/ Race/Income	Sample (n)	Number of Physician Visits (pv)	Physician Visits per Person per Year (PU)	
			Central HSA	U.S.*
Age	5,000	22,500	4.5	4.9
0-16	1,500	4,300	2.9	4.1
17-24	750	3,600	4.8	4.5
25-44	1,250	6,400	5.1	5.0
45-64	1,000	5,200	5.2	5.5
65-74	350	2,075	5.9	6.9
75+	150	925	6.2	6.5
Sex				
Male	2,400	9,000	3.8	4.3
Female	2,600	13,500	5.2	5.6
Race				
White	4,000	19,100	4.8	5.0**
All Other	1,000	3,400	3.4	4.4**
Income				
Above Poverty	4,000	17,000	4.3	-
Below Poverty	1,000	5,500	5.5	-

*National Center for Health Statistics, "Current Estimates from the Health Interview Survey: United States-1974" Vital and Health Statistics, Series 10, No. 100, September 1975, p. 25.

**National Center for Health Statistics, "Physician Visits, Volume and Interval Since Last Visit: United States-1971" Vital and Health Statistics, Series 10, No. 97, March 1975, p. 21.

one visit per person per year. These sub-groups include the 0-16 and 65-74 age groups and the non-white racial group.*

In addition to assessing the current patterns of physician utilization in their service areas, HSAs can use the data in Table 4 in estimating the future demand for physicians and outpatient facilities. Discussions of these uses of physician utilization data are contained in Chapter 8 of Section III and Chapter 11 of this section, respectively.

C. Use of Needed Physician Services

One of the most important uses of the data from this survey is the the identification of those persons who are medically underserved. "Medically underserved" is used here to mean those persons who need physicians' services but do not receive them. As was defined earlier in this chapter, the "need" for physician services is operationally measured by the number of disability days, and the "use" of physician services is operationally measured by the number of physician contacts.

Identification of the medically underserved sub-groups of Central HSA can begin with analysis of the data derived from questions 6 and 8 of this survey. These data can be used in the following formula for estimating unmet need:

$$USN = \frac{nc}{nd} \times 100$$

where,

USN = unmet service need (i.e., the percent of sampled individuals reporting disability who did not make a physician contact)

nc = the number of persons reporting disability with no resulting physician contact.

nd = the number of persons reporting disability

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*In making such comparisons, the issue of the "standard error" as was discussed earlier in regards to the data in Table 2, applies here.

The number and percent of persons not seeing a physician when needed are presented in Table 5 for various sub-groups in Central HSA. The figures in the first column of Table 5 (nd) are the same as those that appeared in the second column of Table 1, (i.e., those persons who responded "yes" to question 6). In the second column of Table 5 are the number of persons in the first column who did not contact a physician in response to their reported illness or injury (i.e., those persons who responded "yes" to question 6 and "no" to question 8).*

The data in Table 5 can provide HSAs with useful information concerning the extent of medical underservice (i.e., the percent unmet need) among their population sub-groups. As shown in Table 5, for example, the percent of unmet need for physician services is highest among those persons in Central HSA who are 65 years of age and over. Over half (56%) of all the persons in this age group who needed services did not make contact with a physician. Another age group which exhibited a relatively high amount of unmet need is the 0-16 age group. Among the other socio-demographic sub-groups in Central HSA, the data show that the amount of unmet service need is higher among females as compared to males, non-whites as compared to whites, and those below poverty as compared to those above poverty. From among these sub-groups the differences by level of income are the most striking. The percent of unmet service need for those below poverty is over twice that of the above poverty sub-group (50% as compared to 24% respectively).

Another measure of the use of services relative to their need is the use/need discrepancy ratio. The use/need discrepancy ratio can be used by HSAs as an index of unmet service need, or simply, access to health services. As was noted in Chapter 1 of this section, the use/need discrepancy ratio when used as a measure of access to health

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*In order to isolate those persons who did not contact a physician because of a barrier to access from those persons who have not yet contacted a physician because of the recent onset of illness, those persons who responded to (1) in question 9 were excluded from those who responded "no" to question 8. It may be useful (but was not done here) to also exclude those persons who responded to (7) in question 9, i.e., those persons who failed to see a physician because they felt the condition was not serious enough to warrant a physician visit.

Table 5

Number and Percent of Persons Not Seeing a Physician When Needed During the Past Two Weeks, by Age, Sex, Race and Income, Central HSA

Age/Sex/ Race/ Income	Number of Persons Reporting Disability (nd)	Number of Persons Not Seeing a Physician (nc)	Percent (USN)
Age	860	300	35%
0-16	180	75	42%
17-44	300	50	17%
45-64	200	75	38%
65+	180	100	56%
Sex			
Male	340	100	29%
Female	520	200	38%
Race			
White	670	225	34%
All Other	190	75	39%
Income			
Above Poverty	500	120	24%
Below Poverty	360	180	50%

services deviates from the traditional approach of using utilization of services along. "Since the use of health services is highly related to the prevalence of illness, differences in amount of utilization may simply reflect different levels of health, not access. Therefore, a more appropriate index of access is the ratio (or discrepancy) of use to need for services, which standardizes the use of services for the effects of illness."[10]

The formula for calculating the use/need discrepancy ratio is as follows:

$$UNR = \frac{pv}{dd} \times 100$$

where,

UNR = use/need discrepancy ratio (i.e., the number of physician visits per 100 disability days).

pv = the number of reported physician visits.*

dd = the number of reported disability days.

The necessary data for calculating the use/need discrepancy ratio can be obtained from questions 7 and 11 and/or questions 12 and 13 of this survey. Presented in Table 6 are the use/need discrepancy ratios calculated from the data obtained from questions 12 and 13. The ratios presented in Table 6, therefore, represent the number of physician visits per 100 bed-disability days per year for the various socio-demographic sub-groups in Central HSA. Comparable ratios are also presented for available sub-groups within the United States.

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*The formula presented here for the use/need discrepancy ratio includes in both the numerator and denominator the utilization and need experience of all persons included in the survey sample. The ratios were calculated in this manner in order to be consistent with the type of ratios that could be calculated using NCHS published data for comparative purposes. However, if the intention is to measure utilization relative to need, it makes sense to include in the numerator only those persons who utilized a physician and who reported having disability days. This procedure would provide a more meaningful measure of the utilization patterns of those persons with need.

Table 6

Use of Needed Medical Services, by Age, Sex, Race and Income, Central HSA and the U.S.

Age/Sex/ Race/ Income	Number of Annual Physician Visits (pv)	Number of Annual Bed-Disability Days (dd)	Physician Visits per 100 Bed-Disability Days per Year (UNR)	
			Central HSA	U.S.*
Age	22,500	30,000	75	74
0-16	4,300	6,500	66	86
17-24	3,600	3,000	120	99
25-44	6,400	5,500	116	86
45-64	5,200	6,750	77	65
65+	3,000	8,250	36	47
Sex				
Male	9,000	10,000	90	73
Female	13,500	20,000	68	74
Race				
White	19,100	22,000	87	-
All Other	3,400	8,000	43	-
Income				
Above Poverty	17,000	18,000	94	-
Below Poverty	5,500	12,000	46	-

*National Center for Health Statistics, "Current Estimates from the Health Interview Survey: United States-1974." Vital and Health Statistics, Series 10, No. 100, September 1975, pp. 22 and 25.

The usefulness of the ratios presented in Table 6 relative to the physician utilization rates presented in Table 4 for purposes of assessing access to health services, can best be illustrated in reference to the income sub-groups within Central HSA. As shown in Table 4, the rate of physician utilization was higher for the below poverty as compared to the above poverty income groups (5.5 as compared to 4.3 physician visits per person per year respectively). On the basis of this utilization information alone, it would appear that access to physician services is not a problem among those persons in Central HSA with incomes below the poverty level. As a matter of fact, this income group has greater access to physician services than the above poverty group, as evidenced by their higher rate of physician utilization. However, when the use of physician services relative to need is compared, access to needed physician services does appear to be a problem for those persons in Central HSA with incomes below the poverty level. As shown in Table 6, relative to need, the above poverty group utilizes a physician at a rate over twice that of the below poverty group (94 as compared to 46 physician visits per 100 bed-disability days per year respectively). In other words, when the need for physician services is controlled, the below poverty group makes only about half as many physician contacts as the above poverty group.

D. Barriers to Access

With the use of the use/need discrepancy ratios in Table 6, HSAs will be able to identify those population sub-groups in their service areas that are medically underserved and, therefore, whose access to health services need to be increased. In order to develop effective plans for increasing accessibility to health services among these groups, HSAs will need to know which factors have been preventing them from obtaining needed services. The data obtained from questions 9, 15, 16 and 17 of this survey can provide HSAs with the necessary information to identify these barriers.

Presented in Table 7, for example, are the results of the responses to question 15. In this table, the frequency with which each reason was mentioned as the main reason for not seeing a physician when desired during the past year is presented for each of three age groups. The data in Table 7 indicate that the lack of adequate transportation constitutes the most significant barrier among those persons aged 65 and over. Half of all the persons in this age group who did not see a physician when they wanted to indicated that the lack of transportation was the main reason for not seeing the physician.

Among those persons in the 17-64 age group, the data in Table 7 indicate that the unavailability of doctors constitutes the most serious barrier. For those persons under age 17, the failure to see a physician when desired is most often the result of a financial barrier.

Other potential barriers to physician utilization are the availability of a regular source of physician care and the length of time normally required to get to that source of care. Presented in Tables 8 and 9 are examples of how the data obtained from question 16 of this survey can be displayed for purposes of assessing the first of these factors.

In Table 8, the percent of sampled individuals in various socio-demographic sub-groups of Central HSA who reported that they did not have a regular source of care is presented. Also presented in Table 8 are

Table 7

Reasons for Not Seeing a Physician When Desired During the Past Year, by Age, Central HSA

Reasons for Not Seeing a Physician	Age		
	Under 17	17-64	65+
	100%	100%	100%
No appointment	7%	10%	5%
No doctor	15%	25%	10%
No money	25%	18%	20%
No transportation	19%	15%	50%
Too far, too much time	18%	19%	5%
Other reason	16%	13%	10%

Table 8

Number and Percent of Persons with No Regular Source of Care, by Age, Sex and Race, Central HSA and the U.S.

Age/Sex/Race	Percent with No Regular Source of Care	
	Central HSA	U.S.*
Age	15%	11%
1-5	8%	6%
6-17	9%	8%
18-34	12%	13%
35-54	15%	13%
55-64	14%	12%
65+	22%	11%
Sex		
Male	18%	13%
Female	12%	9%
Race		
White	14%	10%
All Other	17%	16%

*Ronald Andersen, et al., Health Service Use: National Trends and Variations-1953-1971. DHEW Publication No. (HSM) 73-3004, October 1972, p. 4.

percentages in comparable sub-groups of the United States population. As shown in Table 8, the percentage of persons without a regular source of care is higher in most of the population sub-groups of Central HSA as compared to the United States. Of particular interest is the finding that the percentage without a regular source of care among those aged 65 and over is twice as high in Central HSA as compared to the United States (22% as compared to 11% respectively). Thus, the lack of a regular source of care, as well as the lack of transportation, may account for the relatively low use/need discrepancy ratio in Table 6 for the aged population of Central HSA.

A more detailed analysis of the relationship between having a regular source of care and seeing a physician when needed is presented in Table 9. The sampled individuals who reported having one or more two-week restricted activity days (i.e., the 860 individuals who responded "yes" to question 6 of the survey) are distributed in the various cells of Table 9 as follows:

cell [A] = the number of individuals who reported having a regular source of care and who reported seeing a physician during the two-week period (400).

cell [B] = the number of individuals who reported having no regular source of care and who reported seeing a physician during the two-week period (30).

cell [C] = the number of individuals who reported having a regular source of care and who reported not seeing a physician during the two-week period (330).

cell [D] = the number of individuals who reported having no regular source of care and who reported not seeing a physician during the two-week period (100).

The percentages in each cell are derived on the basis of the column totals, i.e., 730 for cells [A] and [C], and 130 for cells [B] and [D].

Table 9

Number and Percent of Persons with Two-week Restricted Activity Days Who Saw a Physician, by Whether or Not They Had a Regular Source of Care, Central HSA

		Had a Regular Source of Care		
		YES	NO	
Saw a Physician	YES	[A] 55% (400)	[B] 23% (30)	(430)
	NO	[C] 45% (330)	[D] 77% (100)	(430)
		100% (730)	100% (130)	(860)

As shown in Table 9, those persons who needed to see a physician were more likely to see a physician if they had a regular source of care than if they did not have a regular source of care. This is indicated by the fact that among those persons with a regular source of care 55% saw a physician (cell [A]) whereas, among those persons without a regular source of care only 23% saw a physician (cell [B]). Knowing that the availability of a regular source of care increases accessibility to health services has important implications in the promotion by HSAs of programs, such as HMOs for example, whose purpose it is to provide a regular source of care.

Appendix A

Interviewing Techniques

1. Pre-interview check: Before making the telephone call there are several things which you should do. First, check to make sure that you have all of the materials needed to conduct an interview; for example, copies of blank questionnaires, pencils, etc.

2. Introduction: The introductory paragraph on the second page of the questionnaire tells the respondent who you are, where you are from, and why you are calling. In most cases, this information will be sufficient. Most respondents will accept your introduction as an explanation for why you are conducting the survey. However, there will be a few who will want more information about the survey and you should be prepared to answer their questions.

   Some may be concerned about the confidentiality of the data being obtained. In this situation, you would want to stress the confidential treatment that is given all information. This should also be done at any point during the interview if the respondent should hesitate to answer certain questions because of concern over the confidential nature of the information being obtained.

   There may be a few other respondents who are reluctant to give information, or who may actually refuse to be interviewed because they don't want to be bothered or because they don't believe the survey has real value.

   Your ability to be able to explain why the survey is being conducted, and its importance in terms of how the data are used will have a great effect on the number of respondents that decide to participate in the survey.

   Some respondents will not be as concerned about receiving an explanation of the survey as they will about why their household was selected or how long the survey will take. If either of these questions arise, use the following as a guide in answering these questions.

3. Household selection: Stress the fact that the telephone number was picked rather than the actual family. Who lives there and whether or not they have problems with their health had nothing to do with the selection. The telephone number was selected at random (i.e., by chance) from the directory of the particular area being surveyed.

When combined, the information obtained from the sample will be representative of the total population living in the survey area.

4. Time: This will depend on the number of people in the family and on their health conditions.

   If the respondent states that he has no time right now for an interview, find out when you can call back. However, always assume (without asking) that the respondent has the time right now unless he tells you otherwise.

5. Starting quickly: If the noise from a television, radio, or record player makes it difficult to hear the respondent, don't be afraid to ask him to turn it down. Most respondents will automatically accomodate you in these ways, however, without having to be asked.

   Begin immediately with the first question of the interview: "What is your name?" The sooner the respondent begins to participate in the interview, the better. To start off with the interview is much more desirable than to describe the types of questions you are planning to ask.

   You will also find that the sooner you begin the interview, the respondent will be less likely to ask you such questions as: "What's this all about?"

6. Your own manner: Your greatest asset in conducting an interview efficiently is to combine a friendly attitude with a business-like manner. If a respondent's conversation wanders away from the interview, try to cut it off tactfully; preferably by asking the next question on the questionnaire. Otherwise, the interview becomes costly and inefficient.

   Overfriendliness and concern on your part about the respondent's personal troubles may actually lead to your obtaining less information. On the other hand, being so abrupt as to offend the respondent can also have a detrimental effect on the interview.

7. Objectively: It is especially important in this survey that you maintain an objective attitude. Do not indicate a personal opinion about replies you receive to questions by your tone of voice. Since the illness discussed may be of a personal or serious nature, expressions of surprise, disapproval or even sympathy on your part may cause respondents to give untrue answers or to withhold information. Your own objectivity about the questions will be the best method for putting the respondent at ease and making him feel free to tell you of the illnesses in his family.

Unless an interviewer reacts to respondents in a neutral way, and not in a negative or positive way, the respondent may thereafter answer questions the way he thinks he "OUGHT" to, rather than giving true answers.

If a respondent perceives an interviewer to be approving of an attitude, he subsequently might be inclined to repeat or over-emphasize that attitude and avoid expressing feelings in conflict with it.

With a negative reaction, the respondent might modify or withhold certain kinds of information. The important point to remember here is to BE OBJECTIVE.

8. Extra information: Sometimes respondents will start describing the health of the family in answer to the very first question and will cover their own illnesses, visits to doctors and dentists, and those of other family members in such a way that it is difficult to keep straight which person did what. When this happens, you should explain your problem to the respondent, namely, that you cannot keep up with him in recording the information and, at the same time, be sure that you are recording accurately what he says. Then ask him to permit you to ask the questions as they appear so that he won't need to give the information more than once.

9. Pacing: Try to avoid hurrying the interview even under trying circumstances. If the respondent senses that you are in a rush to complete the questions, he will probably cooperate by omitting important health information which he might feel would take too much time to explain and record.

Maintaining a calm, unhurried manner and asking the questions in an objective and deliberate way will do much to promote an attitude of relaxed attention on the part of the respondent.

10. Question wording: The wording and order of each question have been carefully designed to obtain the desired information. Therefore, the uniformity and value of the final results depend on all interviewers asking the questions in the same order and with the same wording. If you change the order, it is likely that both you and the respondent will become confused. If you fail to follow the correct interviewing sequence, you may not remember to ask every appropriate question about each family member. A question asked out of order could also influence an answer to a later question.

11. Repeating answers: Sometimes it is helpful to repeat the respondent's answer and then pause expectantly. Often this will bring out additional information on the subject.

It is also useful as a check on your understanding of what has been said, especially if the statements or comments given have not been entirely clear. For example, "Including your doctor visit last week, that makes three times during the past twelve months?"

12. Asking additional questions: Sometimes a person will give you an answer which does not furnish the kind of information you need or one which is not complete. An interviewer must be thoroughly familiar with what information questions are designed to elicit in order to be able to distinguish what responses are incomplete, unclear, inconsistent, or lacking in sufficient detail to be useful. Ask additional questions in such cases, being careful to encourage the respondent to do the explaining without suggesting what the explanations might be. Ask as many questions as necessary to satisfy yourself that you have obtained complete and accurate information insofar as the respondent is able to give it to you.

Ask in such a way that you obtain the information required without suggesting specific answers to the respondent. For example, "Please explain that a little more," "Please describe what you mean." Fit the questions to the information which has already been given. In some instances you may need to suggest specific alternatives to the respondent when general phrases have not been successful in obtaining the information. This is also an acceptable method for asking additional questions, provided the respondent is never given a single choice. Any items specifically suggested to the respondent must always consist of two or more choices. The following examples illustrate both acceptable and unacceptable methods for asking additional questions.

	ACCEPTABLE	NOT ACCEPTABLE
1)	Can you tell me the approximate number of days?	Would you say it was six days?
2)	Do you live together in this household?	Are you all one household?
3)	Does she live the greater part of the year here or at her sister's home?	Is she a member of this family?

The "not acceptable" questions in examples 2) and 3) show an interviewer who is unable to apply this survey's rules for determining the composition of a household, and expects the respondent (who does not know these rules) to make the decision.

The "not acceptable" question in example 1) illustrates an invitation to the respondent to just say "Yes" without giving any thought to the question.

13. *Do not know answers*: Sometimes the respondent may not know the answers to the questions, and if this is the case, record the fact he does not know. Other respondents think out loud before giving their answers. They may say "Well, I don't know..." pausing then to think about their answer. Do not record "don't know" answers too quickly—this could result in the respondent not giving information to a question he really knows the answer to. When you think that this may be the situation, wait for the respondent to finish the statement before repeating the question or asking an additional question.

    However, do not "over-probe." If the respondent says he does not know the answer to a question and you have given him time to think about his answer, do not try to insist that he give *some* answer. This might irritate the respondent, and also make him wonder about our interest in accurate responses.

14. *Recording information correctly*: Recording information correctly is just as important a part of the interview as asking the questions correctly. This involves writing clearly and plainly, recognizing in advance the amount of space allotted for descriptive entries and adjusting the size of your writing to fit into the space provided. Be careful not to leave blank spaces where they should be filled in.

    Use a black pencil or ball point pen.

    Use "DK" for "don't know" only to indicate that the *respondent* does not know the answer to a particular question. Do *not* use it to fill answers for questions that you may have overlooked at the time of the interview.

15. *Recording answers completely*: Although this next instruction seems almost unnecessary to mention, a respondent's answer to a question must be recorded at the time it is given. Some interviewers, so as not to interrupt the natural flow of an interview, might be hesitant to take the time to record a lengthy answer during an interview, but rather abbreviate this response with the intention of entering the detailed information after the interview. Interviewers should avoid falling into this practice. Respondents, for the most part, recognize that an interviewer needs to take time during an interview to record the answers he gives and will be quite willing to wait while an interviewer makes these entries.

Appendix B

Example Codebook

Column(s)	Variable	Source	Codes
Card 1:			
1-5	Family ID	cover sheet	00001-n
6-7	Family Size	questionnaire	01-n (number of family members for whom data were obtained)
8-13	Family Income	Q21	record actual annual dollar amount, e.g., 025000 = $25,000 999999 = unknown
14	Poverty Status	Created	0 = below poverty level 1 = above poverty level 9 = unknown
15	Race (Race of Head, if family is of mixed racial background)	Q20	1 = White 2 = Black 3 = Mexican American 4 = Puerto Rican 5 = American Indian 6 = other 7 = mixed 9 = unknown
16-17	Person ID	Q1-3	01-n, refers to the column number in which data for this person are obtained. 01 will always be the respondent
18	Relationship to Head of Family	Q4	1 = head 2 = spouse of head 3 = child of head 4 = grandchild of head 5 = parent of head 6 = other relative 9 = unknown

Column(s)	Variables	Source	Codes
19-20	Age	Q5	00-98, code actual age. If older than 98 years, code 98. 99 = unknown
21-22	Education	Q18	00 = no formal education 01-n number of years completed 98 = does not apply 99 = missing data
23	Restricted Activity	Q6	0 = no 1 = yes 9 = missing data
24-25	Restricted Activity Days	Q7	00-14 = number of days 99 = missing data
26	Responsive Doctor Contact	Q8	0 = no 1 = yes 8 = does not apply 9 = missing data
27	Reason for No Responsive Doctor Contact	Q9	1 = recent illness 2 = no appointment 3 = no doctor 4 = no money 5 = no transportation 6 = too far 7 = not serious enough 8 = does not apply 9 = missing data
28	Chronic Health Problem	Q10	0 = no 1 = yes 9 = missing data
29-30	Two-week Doctor Contacts	Q11	00-n code actual number 99 = missing data
31-33	One Year Bed-Disability Days	Q12	000-365 code actual number of days 999 = missing data
34-36	One Year Doctor Contacts	Q13	000-n code actual number 999 = missing data

Column(s)	Variables	Source	Codes
37	Failure to See Doctor When Wished to Do So	Q14	0 = no 1 = yes 9 = missing data
38	Reason for Not Seeing Doctor	Q15	1 = no appointment 2 = no doctor 3 = no money 4 = no transportation 5 = too far 8 = does not apply 9 = missing data
39	Usual Source of Care	Q16	0 = no usual source 1 = doctor's office 2 = hospital outpatient clinic/department 3 = company clinic 4 = other clinic 5 = hospital emergency room 9 = missing data
40-42	Distance	Q17	000-n code number of minutes 998 = does not apply 999 = missing data

Card 2: can be used for coding the detailed address information in question 19, if desired. The family ID number should be also included on this card.

FOOTNOTES - SECTION IV

Chapter 10

1. Public Law 93-641, Section 1513 (b) (1) (E).

2. *Ibid*., Section 1502 (1), (3) and (4).

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4. Anne R. Somers, *Health Care in Transition: Directions for the Future*. Hospital Research and Educational Trust, Chicago, Illinois, p. 29; and National Center for Health Statistics, *Health Resources Statistics: Health Manpower and Health Facilities, 1974*, DHEW Publication No. (HRA) 75-1509, p. 471.

5. American Hospital Association, *Hospital Statistics 1974 Edition*. Chicago, Illinois, p. 7, Table 3.

6. Somers, *op cit*., p. 30.

7. P.L. 93-641, Section 1513 (b) (1) (B) and (E).

8. *Ibid*., Section 1532 (c) (3) and (4).

9. *Ibid*., Section 1532 (c) (7).

10. *Ibid*., Section 1502 (6).

11. *Ibid*., Section 1513 (d) (1).

12. P.L. 92-603, Section 1156 (a).

13. Center for Health Services Research and Development, *Socioeconomic Issues of Health*, Chicago, Illinois: American Medical Association, 1974, p. 131.

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15. *Ibid*., p. 1.

16. NCHS, "1973-74 Nursing Home Survey - Provisional Data," Monthly Vital and Health Statistics, Vol. 23, No. 6, September 5, 1974, pp. 2-3.

17. P.L. 93-641, Section 1513 (b) (1) (D) and (E).

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24. Ibid.

25. P.L. 93-641, Section 1513 (b) (1) (A).

26. Robert L. Eichhorn and Andrew M. Kulley, Health Services Data System: The Family Health Survey. Health Services Research and Training Program, Purdue University, West Lafayette, Indiana, June 1972, p. 6.

27. P.L. 93-641, Section 1513 (a) (2); and Section 1535 (c) (7) (B).

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1. National Center for Health Statistics, "National Ambulatory Medical Care Survey: Background and Methodology," Vital and Health Statistics, Series 2, No. 61. DHEW Publication No. (HRA) 74-1335, April 1974, p. 1.

2. Ibid.

3. NCHS, "Ambulatory Medical Care Records: Uniform Minimum Basic Data Set," Vital and Health Statistics, Series 4, No. 16. DHEW Publication No. (HRA) 75-1453, August, 1974, p. 15.

4. NCHS, Monthly Vital Statistics Report, DHEW Publication No. (HRA) 76-1120, Supplement (2), July 1975, p. 8.

5. NCHS, Health Resource Statistics: Health Manpower and Health Facilities, DHEW Publication No. (HRA) 75-1509, 1974, p. 471.

6. Ibid.

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15. Jane H. Murnaghan, op. cit., p. 15.

16. NCHS, "Current Estimates from the Health Interview Survey: United States - 1974," Vital and Health Statistics, Series 10, No. 100, DHEW Publication No. (HRA) 76-1527, September 1975, p. 25.

17. Jane H. Murnaghan, op. cit., p. 10.

18. P.L. 93-641, Section 1513 (c) (2).

19. Ibid., Section 1532 (c) (3).

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13. *Ibid*., Section 1532 (c) (5).
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18. P.L. 93-641, Section 1601.

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10. See footnote 26, Chapter 1, Section IV.

This completes volume II
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